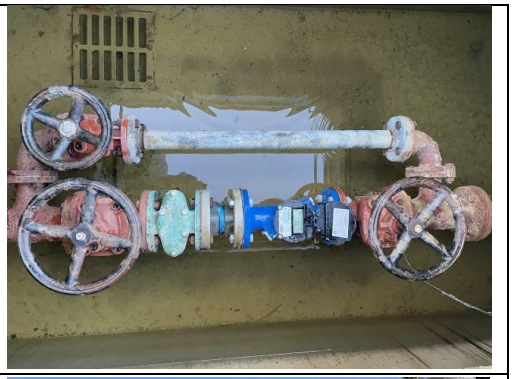
FINAL REPORT
WATER DISTRIBUTION AND METER MANAGEMENT AUDIT
CITY OF ROCKDALE, TEXAS
JANUARY 2023

JBS Water, Inc.

Houston, Texas

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Specialists in Water System Accountability

January 19, 2023

Mr. Jerald Brunson – Director of Public Works
Ms. Barbara Holly – City Manager
City of Rockdale
PO Box 586
Rockdale, TX 76567

Ref: 2021-2022 Water Production, Metered Consumption & NRW Review

Mr. Brunson:

We are pleased to submit our findings for the recent Water and Meter Management Audit and NRW review. The report summarizes the findings after reviewing 36 months of metered consumption history of each active account, meter sizing issues, production meter test results, line break history and night-time District Measurements.

The data for the 12 months ending in December 2022 indicate that the annualized NRW has decreased since January 2022 by approximately 3.3 MG, and nearly 15 MG since January 2021. However, NRW has increased significantly the last three months of the year compared to past months.

The first chapter of our report summarizes work completed and presents multiple recommendations that provide the City with action items for the maintaining low levels of water levels and improving accounted for volumes.

Thank you for the opportunity to conduct this project and for all the cooperation extended to us by City staff.

Sincerely,
JBS Water, Inc.

James B. Smith, President

FINAL REPORT

COMPREHENSIVE WATER DISTRIBUTION & METER MANAGEMENT AUDIT
CITY OF ROCKDALE, TEXAS
January 2023

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City of Rockdale, Texas
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CHAPTER 1
EXECUTIVE SUMMARY & RECOMMENDATIONS

Chapter 1 CITY OF ROCKDALE, TX WATER & METER MANAGEMENT AUDIT EXECUTIVE SUMMARY & RECOMMENDATIONS

1. INTRODUCTION

The City of Rockdale) authorized JBS Water, Inc. to conduct a comprehensive Water and Meter Management Audit. Applying best management practices, the objectives of the evaluation were to verify the current volume of water loss associated with metering, to identify the various causes of this loss, to consider the potential long-range cost-effectiveness of programmed meter application, sizing and replacement.

The scope of work for this study included:

• Analysis of Water Production Meters	• Analysis of Line Break History
• Analysis of Water Production & Sales Data	• Night Flow Measurements
• Comprehensive Analysis of Metered Accounts	• NRW Tabulation
• Large Meter Inspections	• Final Report
• Meter Sizing Analysis	

1.1 SUMMARY OF WATER AUDIT

The City transferred to JBS approximately 2,200 active metered account records, three years of line break history and water production records. The database transfer included a 36-month metered consumption history of each account through October 2022. Monthly totals of water production and sales data was supplied through December 2022.

1.1.1 Water Production and Sales History

The table and graphs on the following pages summarize monthly, quarterly and annualized or YTD production and sales totals. At year end, the ***"unadjusted"*** annualized metered ratio for the City is approximately 70.1%, indicating a 29.9% Non-Revenue Water (NRW). ***It should be noted that the monthly production totals in January 2022 were lower than total water billed. An arbitrary adjustment was made by averaging the two months prior and after. Those months are highlighted in the table.***

Two production meters located at Airport #11 and the New Texas Well were over-registering by more than 10% and 20% and the Tracy Well had slight over-registration of 6%. Adjustments to production totals were not made to the following table or graphs because there is not a clear-cut time period when the over registrations may have occurred. However, the meter over registrations can have as much as a 13.9 MGY impact on NRW totals. The table clearly shows a 20% plus increase in NRW during the last three months of 2022.

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PRODUCTION AND SALES HISTORY

Mo./Yr	Total Pumped MG	Wtr Sales MG	NRW MG	NRW %	Qtr Pumped MG	Qtr Sales MG	YTD Prod. MG	YTD Sales MG	YTD NRW MG	YTD NRW %	YTD MR %
Dec-19	18.288	10.987	7.3	39.9%	59.6	41.0	270.8	181.7	89.1	32.9%	67.1%
Jan-20	16.258	11.947	4.3	26.5%	52.5	36.5	265.8	181.4	84.4	31.8%	68.2%
Feb-20	16.338	9.660	6.7	40.9%	50.9	32.6	264.9	180.0	84.9	32.1%	67.9%
Mar-20	17.550	12.065	5.5	31.3%	50.1	33.7	262.6	178.9	83.7	31.9%	68.1%
Apr-20	18.640	12.412	6.2	33.4%	52.5	34.1	262.5	178.0	84.4	32.2%	67.8%
May-20	21.482	14.071	7.4	34.5%	57.7	38.5	262.4	179.4	83.0	31.6%	68.4%
Jun-20	26.884	19.778	7.1	26.4%	67.0	46.3	266.8	184.0	82.8	31.0%	69.0%
Jul-20	29.469	10.212	19.3	65.3%	77.8	44.1	271.2	176.5	94.7	34.9%	65.1%
Aug-20	28.528	21.831	6.7	23.5%	84.9	51.8	264.6	175.9	88.6	33.5%	66.5%
Sep-20	20.592	13.983	6.6	32.1%	78.6	46.0	255.4	167.0	88.4	34.6%	65.4%
Oct-20	21.557	15.031	6.5	30.3%	70.7	50.8	253.6	165.6	88.0	34.7%	65.3%
Nov-20	19.776	13.585	6.2	31.3%	61.9	42.6	255.4	165.6	89.8	35.2%	64.8%
Dec-20	18.805	12.265	6.5	34.8%	60.1	40.9	255.9	166.8	89.0	34.8%	65.2%
Jan-21	20.511	9.839	10.7	52.0%	59.1	35.7	260.1	164.7	95.4	36.7%	63.3%
Feb-21	27.051	16.130	10.9	40.4%	66.4	38.2	270.8	171.2	99.6	36.8%	63.2%
Mar-21	21.388	12.510	8.9	41.5%	69.0	38.5	274.7	171.6	103.0	37.5%	62.5%
Apr-21	22.099	12.412	9.7	43.8%	70.5	41.1	278.1	171.6	106.5	38.3%	61.7%
May-21	21.363	11.283	10.1	47.2%	64.9	36.2	278.0	168.9	109.2	39.3%	60.7%
Jun-21	23.542	16.506	7.0	29.9%	67.0	40.2	274.7	165.6	109.1	39.7%	60.3%
Jul-21	23.784	14.455	9.3	39.2%	68.7	42.2	269.0	169.8	99.2	36.9%	63.1%
Aug-21	28.748	18.804	9.9	34.6%	76.1	49.8	269.2	166.8	102.4	38.0%	62.0%
Sep-21	27.870	22.612	5.3	18.9%	80.4	55.9	276.5	175.4	101.1	36.6%	63.4%
Oct-21	19.704	13.515	6.2	31.4%	76.3	54.9	274.6	173.9	100.7	36.7%	63.3%
Nov-21	15.890	13.297	2.6	16.3%	63.5	49.4	270.8	173.6	97.1	35.9%	64.1%
Dec-21	12.280	10.585	1.7	13.8%	47.9	37.4	264.2	171.9	92.3	34.9%	65.1%
Jan-22*	**10.507**	**11.280**	**-0.77**	**-7.3%**	**Original Data**						
Jan-22*	**13.547**	**11.280**	**2.3**	**16.7%**	41.7	35.2	257.3	173.4	83.9	32.6%	67.4%
Feb-22	13.591	12.035	1.6	11.5%	39.4	33.9	243.8	169.3	74.5	30.6%	69.4%
Mar-22	12.425	10.579	1.8	14.9%	39.6	33.9	234.8	167.4	67.5	28.7%	71.3%
Apr-22	19.305	14.336	5.0	25.7%	45.3	36.9	232.0	169.3	62.8	27.0%	73.0%
May-22	24.154	14.876	9.3	38.4%	55.9	39.8	234.8	172.9	62.0	26.4%	73.6%
Jun-22	27.829	22.086	5.7	20.6%	71.3	51.3	239.1	178.5	60.7	25.4%	74.6%
Jul-22	31.284	24.570	6.7	21.5%	83.3	61.5	246.6	188.6	58.1	23.5%	76.5%
Aug-22	27.913	20.485	7.4	26.6%	87.0	67.1	245.8	190.3	55.5	22.6%	77.4%
Sep-22	21.910	16.782	5.1	23.4%	81.1	61.8	239.8	184.4	55.4	23.1%	76.9%
Oct-22	28.486	15.886	12.6	44.2%	78.3	53.2	248.6	186.8	61.8	24.9%	75.1%
Nov-22	23.249	12.968	10.3	44.2%	73.6	45.6	256.0	186.5	69.5	27.2%	72.8%
Dec-22	25.958	13.178	12.8	49.2%	77.7	42.0	269.7	189.1	80.6	29.9%	70.1%

Source: City of Rockdale staff and JBS Water, Inc.

**Original data showed more water sold than produced. We averaged the two months before and after to balance out the production and sales table.*

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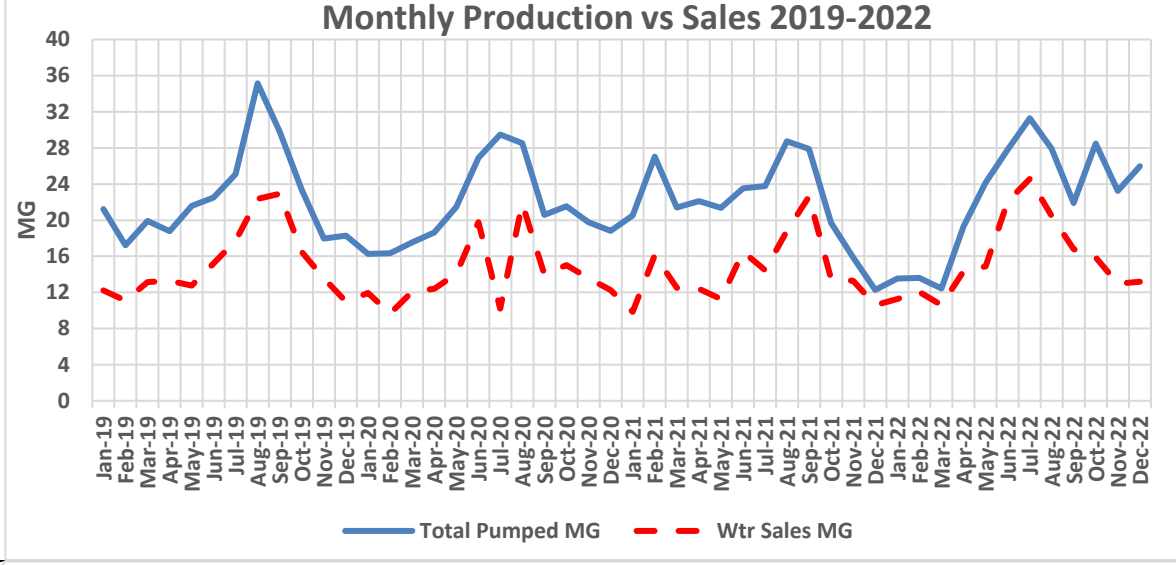

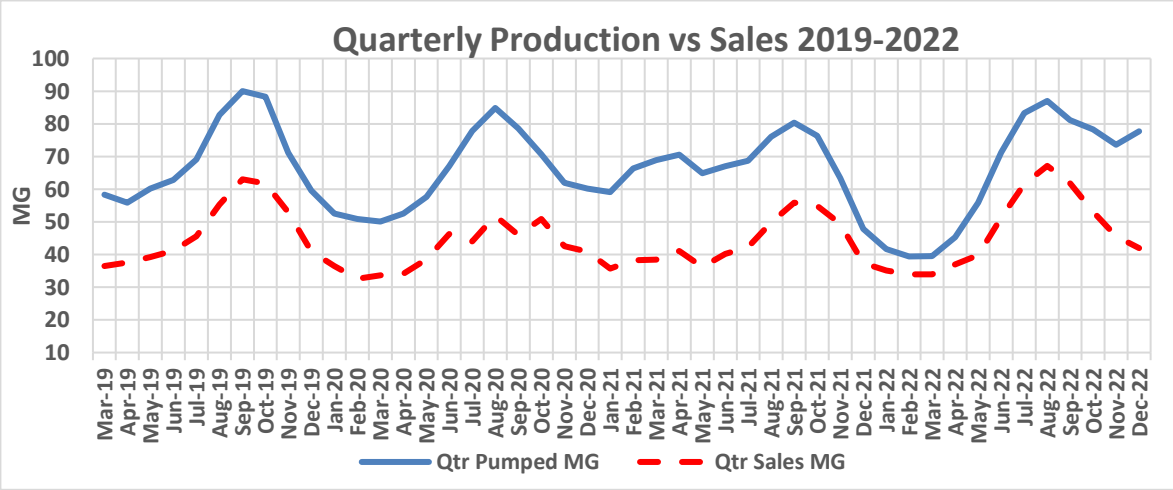

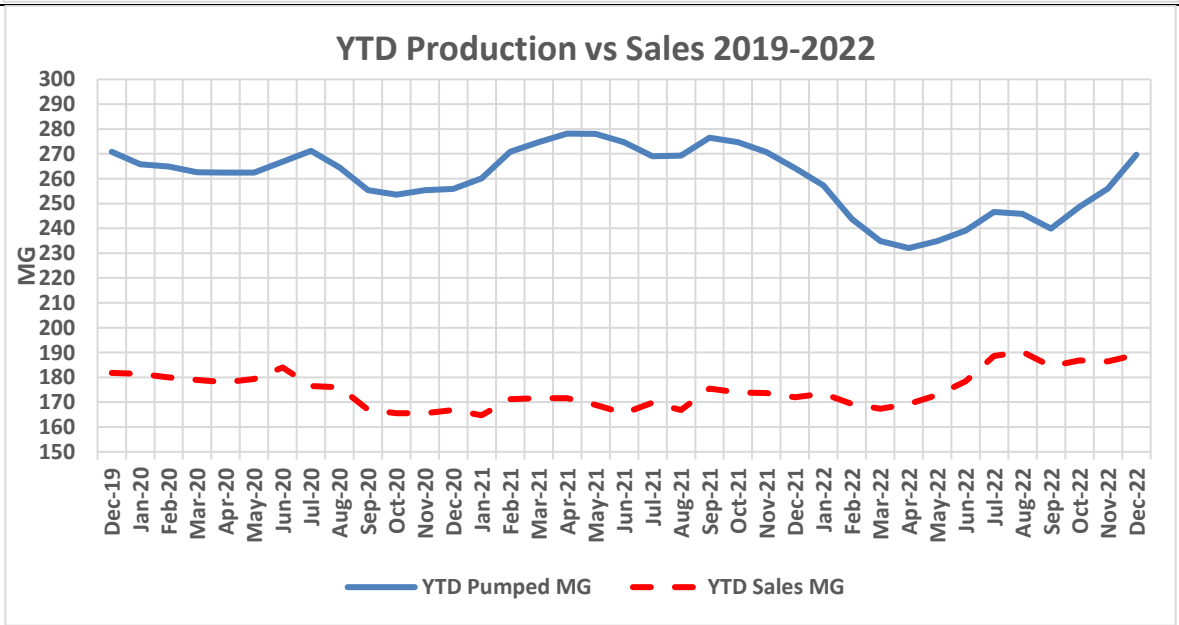

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1.1.2 Evaluation of Real Losses

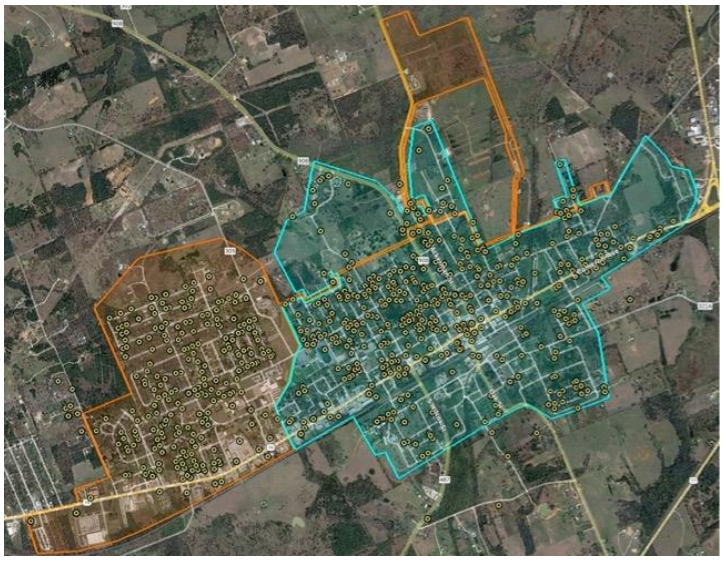
The City provided over 1,140 work orders for the period January 2019 to October 2022. The output format of work order data (pdf) did not lend itself to efficient detailed analysis. Although there is useful data provided in the free text, it was not possible to drill down into the hundreds of work orders. We devoted over 25 hours of time parsing the data provided (314 work orders) to be able to accomplish a review of the 2022 data alone.

In the 2022 data, JBS identified a total of 217 City side leak repairs including 27 main breaks and 161 service leaks. Some main breaks incur significant volumes of loss, mostly found to be on old cast iron and asbestos cement pipe. Of course, some main breaks are of a sudden nature; they break out and are discovered and repaired quickly, but some may linger undetected for extended periods. The City should consider a multi-year leak detection program to identify leaks before they appear. Combined with an on-going mains replacement program in the areas of high leak incidence, the City would benefit from greatly reduced volumes of real losses each year.

ESTIMATED LOSSES FROM REPAIRED LEAKS IN 2022

Leak Type	2022 Leaks	Est. Loss/ Leak (gpm/Leak)	Avg. No. Days/ Leak	Total Avg. Loss (gpm)	Total Loss (GPY)	Gallons Lost/ Mile/Yr	Gallons Lost/ Connection/Yr
F.H. Leak	5	2	30	0.8	432,000	7,152	198.4
Main Line Break	27	30	1	2.2	1,166,400	19,311	535.8
Service Line Leak	161	3	20	26.5	13,910,400	230,305	6,389.7
Meter Leak	23	0.5	30	0.9	496,800	8,225	228.2
Other Leaks	1	2	60	0.3	172,800	2,861	79.4
Totals	**217**			**30.8**	**16,178,400**	**267,854**	**7,431.5**

The above assessment is based on approximations of typical leak loss observed in similar water systems. It reflects the probable impact of the visible leaks that the City of Rockdale currently repairs on an annual basis.



The adjacent map shows the high and low pressure zones in the City and the historical leaks in each zone. The smaller zone is the high-pressure zone where a higher percentage of breaks occur.

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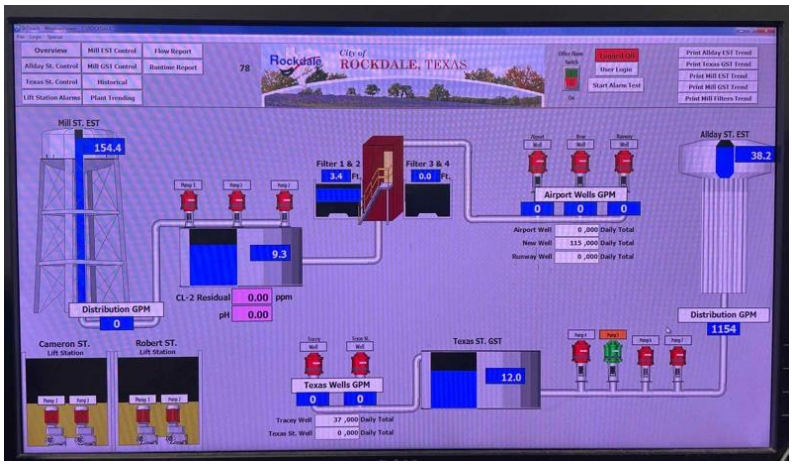
1.1.3 Nighttime District Measurements

The City of Rockdale essentially operates the water system as two adjacent and separate pressure planes (PP) based on supply sources as well as distribution needs.

It was intended that the minimum night flow test be conducted using the existing pressure zones. Public Works personnel undertook the preparation for this activity and verified the existence and operating condition of specific isolation valves (IV) and pressure regulating valves (PRV) prior to undertaking the test.

DISTRIBUTION SYSTEM BOUNDARIES

Sector	Zones	Location	Tanks in Sector
1	Allday Pressure Plane 1031 West (combined with PP 971)	Rockdale, west of Childress & Bushdale and FM 487 look to Industrial Sector	Allday EST & Texas GST
2	Mill Street Pressure Plane	Central & East Rockdale	Mill St EST & GST



The night flow test in Rockdale was conducted in the early morning of November 16, 2022. The system's elevated storage tank levels were monitored constantly throughout the test period on the Water Plant's control room display (SCADA).

Additionally, large users' meters were read by City staff to assess night use.

The following table summarizes the results of this test.

MINIMUM NIGHT FLOW TEST RESULTS (NOVEMBER 15-16 2022

Zones	Sq Miles	gpm	Accts	gpm/Acct	Miles	gpm/mile
Zone #1 (Allday-High Pressure)	0.85	193.5	892	0.217	21.06	9.2
Zone #2 (Mill St-Low Pressure)	1.68	135.3	1,287	0.105	33.45	4.0
Total		**328.8**	**2,179**	**0.151**	**54.51**	**13.2**

Typical minimum flows to the system were about 329 gallons per minute. The minimum flow represents the system demand when most of the city is asleep, businesses are closed. The data leads to two significant observations:

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1. The Allday Zone has less pipe and service connections, but used more water on the night of the test.
2. It is likely that the desired zone isolation was not achieved, but that alone does not account for the wide difference.

1.1.4 NRW Summary

The following table and chart provide a summary of our assessment of the City Non-Revenue Water for 2019-2022.

SUMMARY OF NON-REVENUE WATER IN CITY

Source Data From:	Category	MGY	As % of Production	$ Valuation
Chapter 2	Total Un-Adjusted Water Production	266.613	111.1%*	
Chapter 2	Total Adjusted Water Production	239.976	100.0%	$129,587
Chapter 3	Total Consumption Billed	182.180	75.9%	$1,900,138
	Total Base NRW	**57.796**	**24.1%**	
	Summary of NRW Components:			
Chapter 4.7	Un-Billed Metered Use	6.881	2.9%	$71,769
Chapter 4.7	Authorized Un-Billed & Un-Metered Use	4.978	2.1%	$51,923
Chapter 3.4	Estimate of Meter Under-Registration	8.287	3.5%	$86,433
Chapter 4.9	Data Handling Discrepancy	0.456	0.2%	$4,756
Chapter 4.9	Unauthorized Consumption (theft)	0.456	0.2%	$4,756
Chapter 4.3	Losses from Repaired Leaks	16.178	6.7%	$8,736
Chapter 4.5	Allowable Leakage (UARL)	16.054	6.7%	$8,669
Chapter 4.6	Other Sources of Loss	0.000	0.00%	$0
Chapter 4.9	Estimate of Undetermined Losses	11.386	4.7%	$6,149
	Total Estimated NRW	**57.796**	**24.1%**	**$243,191**

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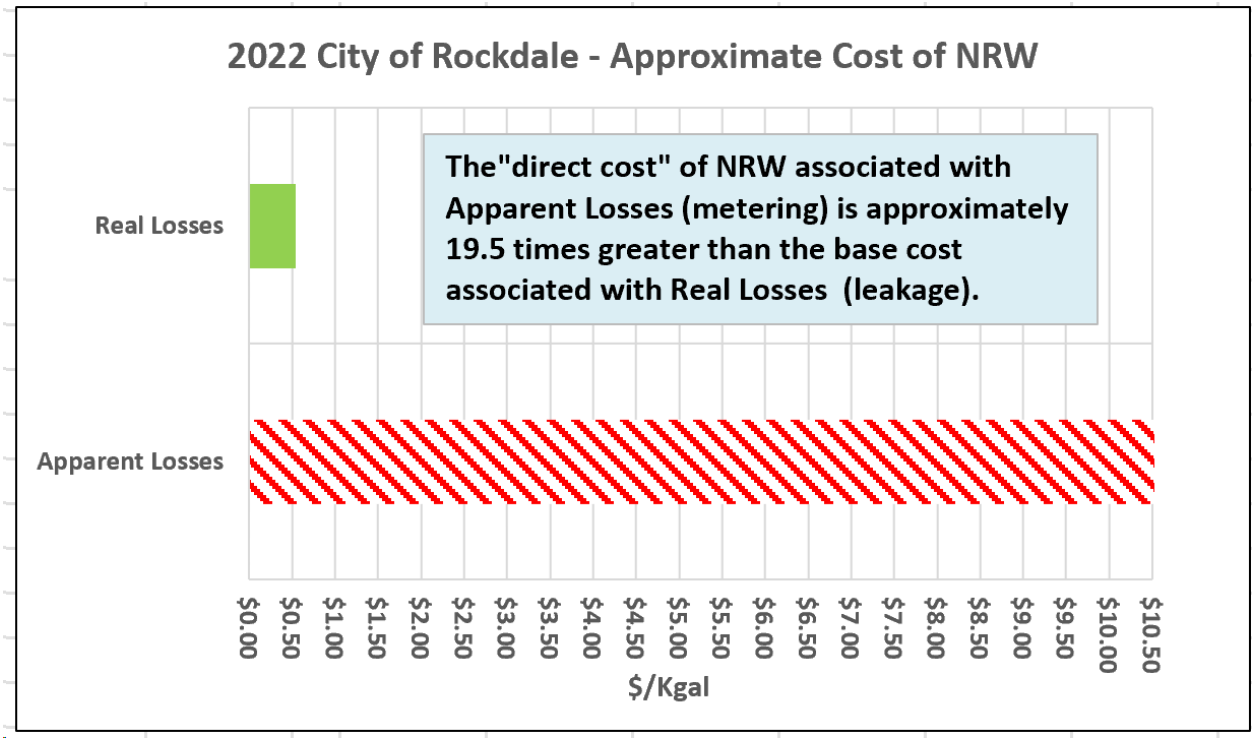
1.2 ESTIMATED COST OF NRW

The ultimate goal of this study has been to analyze the impact and cost of apparent losses and real losses and their relationship to the total NRW in the system. The monthly difference between production and sales, as well as the cost impact, is documented.

Understanding the component costs of NRW makes it straightforward for the City to implement and maintain on-going corrective action.

The following table compares the estimated value of NRW associated with apparent and real losses. Through November 2022, the base production cost (raw water delivery, energy and chemicals) was approximately $0.54 per 1,000 gallons of water produced. Since water loss associated with leakage (Real Losses) is not water sold, this base value is used in the analysis. Based on the City's rate table, the weighted value for all accounts equates to approximately $10.54/1000 gallons.

The chart below shows that water loss associated with metering will cost the City about 19.5 times more than an equal volume associated with pipe leakage. Direct costs do not take into consideration labor, water conservation issues, water plant expansion costs, lawsuits, etc.



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2. RECOMMENDATIONS

2.1 PRODUCTION METERS

The water system's production meters are the principal benchmark against which all water production and consumption should be gauged. Consequently, the dependability of the monthly and annual water production volumes has a significant impact on the assessment of NRW. As such, it is essential that the City can count on reliability and accuracy in its raw and finish water meters.

2.1.1 The City has four active well water meters; two of them supply the Texas St Pumps station and two supply the Mill Street Plant. These should be considered raw water meters as the flows from the well fields do not enter directly into the distribution system. At each plant the well water is given primary treatment and from there it is pumped to distribution via an outflow meter (finish water). All these meters should be maintained and tested annually for accuracy. When calibration of instrumentation is required, meter accuracy should be verified by a volumetric comparison.

2.1.2 The Mill Street outflow meter (Siemens Mag meter) is currently off line due to an instrumentation failure. This meter should be repaired and tested for accuracy as the Plant returns to service at month's end. In addition, we suggest the meter's vault be flushed and cleaned out and protected from future flooding. It is possible that the instrumentation failure is related to the frequent inundations observed in this installation.

2.1.3 The third well at the Airport (Well #8) has been offline for some time. If it is to be rehabilitated, it will have the same needs as the other wells with regard to metering.

2.1.4 We recommend the annual testing process should be followed by a thorough review of total water production and consumption history to confirm trends and ensure the consistency of the City's annual Non-Revenue Water report.

2.1.5 The Texas and Mill Street outflow meters should be considered the prime master meters to measure against all monthly customer use and operational use to establish a stable and accurate account of Non Revenue Water (NRW).

2.1.6 Storage tank overflows, possibly due to SCADA errors, should be reported as leakage. Any unmetered storage tank use for maintenance/cleaning should be recorded as authorized unmetered and unbilled use. This information should be included in annual water loss reports.

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2.2 WATER METERING & BILLING

The following recommendations deal with the metering component and its impact on apparent losses.

2.2.1 Large Meter Low Use Accounts

Low use accounts may be indicators of meter accuracy related issues. All low use accounts were reviewed by meter size, class code, meter age and meter routes. Low use accounts are defined as customers consuming 2,000 gallons or less of water in a one-month period (<2Kgal/mo.). There are 502 low use accounts in the system and 86 are larger than 5/8x3/4-inch.

It should be noted that 12 of these large meter accounts are listed as irrigation accounts. The non-irrigation accounts are either oversized or inaccurate and the City needs to take appropriate action. A total of 65 of these large meter accounts were installed prior to 2015. The following table lists these larger meter low use accounts. These accounts need to be investigated for meter accuracy.

LOW USE LARGE METER ACCOUNTS

Book No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
04	2461	00	ROCKDALE IND SCHOOL	Sch	1	4	>10	26612	0.00
04	2628	03	CGCB PROPERTIES, LLC	Apts	32	4	>10	15650	1.58
04	3391	02	QUALITY INN HPY LLC	Com	1	4	>10	10590	0.00
02	2925	00	CITY OF ROCKDALE	City	1	3	NA	0	0.00
05	0115	00	ROCKDALE VETERINARY CLIN	Com	1	2	2014	2099	1.34
03	0131	01	CITY OF ROCKDALE	City	1	2	2014	905	0.93
03	0585	00	ROCKDALE IND SCHOOL	Sch	1	2	2014	900	1.65
02	1067	01	DAYS INN	Irrig	1	2	2021	7918	0.00
01	2100	10	CITY OF ROCKDALE	City	1	2	2018	1650	1.97
04	2761	02	PERRY & PERRY BUILDERS	Com	1	2	2014	10593	0.88
04	2827	00	LOIS FISHER	Res.	1	2	2014	0	0.00
05	0444	00	CITY OF ROCKDALE	City	1	1.5	2015	0	0.00
01	2090	01	TAYLOR AUTO CREDIT	Com	1	1.5	2014	817	0.00
04	2620	00	PEACE LUTHERAN CHURCH	Church	1	1.5	2014	1167	0.30
04	3388	01	CALDWELL COUNTRY FORD	Com	1	1.5	2014	9669	0.91
03	0015	02	BOTTS TITLE COMPANY	Com	1	1	2014	557	0.28
01	0055	03	THE RIOT GROUP LLC	Com	1	1	2018	1044	0.03
05	0200	00	ROBERT EDWARDS	Res.	1	1	2015	1651	1.08
05	0255	00	RAYMOND MATTHEWS	Res.	1	1	2014	3861	1.99
01	0296	00	CITY OF ROCKDALE	City	1	1	2018	1030	0.11
01	0355	00	DOROTHY ZAVODNY	Res.	1	1	2014	2142	1.67
04	0387	02	VIA REAL ESTATE, LLC	Irrig	1	1	2022	0	0.00
05	0470	01	PEGGY PERRY	Res.	1	1	2014	2443	0.03
05	0530	05	TERRY BLACKMON	Res.	1	1	2014	10803	0.15
05	0570	00	RUTH HANEY	Res.	1	1	2021	2215	0.15
02	0607	00	FRANK MONTELONGO	Res.	1	1	2016	289	0.02
05	0740	00	BECKY PAGE	Res.	1	1	2014	3903	1.13
05	0805	02	ANTHONY TIMPE	Res.	1	1	2014	1459	0.44
01	0850	06	NORA JAIMES	Res.	1	1	2014	8474	1.15
01	0855	00	P H PERRY SR	Res.	1	1	2014	1035	0.05
04	0919	00	KAY THEATER	Com	1	1	2014	1257	0.63
01	0960	00	JOHNNIELYN BROWN	Res.	1	1	2014	3658	0.13
05	1005	03	STEPHEN WOTRING	Irrig	1	1	2014	0	0.00
05	1025	03	LINDA MCMAKIN	Res.	1	1	2014	8737	0.02
03	1110	00	ROCKDALE IND SCHOOL	Sch	1	1	2014	1467	1.57
05	1280	00	DONALD E SHUFFIELD	Res.	1	1	2014	2392	0.94
05	1285	03	CRAIG WHITE	Res.	1	1	2014	2978	0.83
01	1330	06	BRENDA JETER	Res.	1	1	2015	1405	0.01
05	1410	04	CHARLIE HALL	Irrig	1	1	2014	0	0.00

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Book No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
05	1430	05	ROBERT S ODELL	Res.	1	1	2014	4941	0.72
05	1455	00	BOBBIE WOBUS	Res.	1	1	2014	4530	1.50
05	1469	01	JULIE CLARK	Res.	1	1	2019	726	1.94
04	1585	00	STEVE'S TEXACO	Com	1	1	2014	1502	1.51
04	1645	01	LAN H DUONG	Com	1	1	2014	3485	1.72
04	1646	01	DOLLAR GENERAL CORP	Com	1	1	2014	1370	1.57
04	1669	01	O'REILLY AUTO ENTERPRIS	Com	1	1	2019	2522	0.64
04	1670	00	OWENS P/J MATULA REALTY	Com	1	1	2019	8843	1.56
05	1670	05	JOE GUTIERREZ	Irrig	1	1	2014	0	0.00
03	1760	01	AMANDA K. WELLS	Res.	1	1	2021	2131	1.72
03	1865	01	BETTY S CAFFEY	Res.	1	1	2014	1269	0.26
01	1880	02	MAGGIE CONTES	Res.	1	1	2014	2565	1.18
03	1895	01	DAVID STADSKLEV	Res.	1	1	2014	675	0.18
02	1918	01	ELISSA BENFORD	Res.	1	1	2020	784	1.01
03	1920	02	KAMIE FITZGERALD	Res.	1	1	2021	5646	0.00
02	1934	00	EZZARD EVERAGE JR	Res.	1	1	2016	493	0.28
05	2020	06	SUSAN M HAU	Res.	1	1	2021	4295	1.08
05	2025	13	CHRISTIAN MORA	Res.	1	1	2021	1091	1.83
01	2070	00	ST JOSEPH CATHOLIC CH	Church	1	1	2014	0	0.00
01	2070	00	ST JOSEPH CATHOLIC CH	Irrig	1	1	2014	1069	1.98
01	2085	00	ST JOSEPH CATHOLIC CH	Church	1	1	2014	292	0.06
04	2115	00	CHAMBER OF COMMERCE	Com	1	1	2014	7129	0.61
02	2240	00	INST. FOR TEACHING GODS	Church	1	1	2014	99	0.13
02	2416	00	INST. FOR TEACHING GODS	Church	1	1	2014	1577	1.58
03	2440	01	BILL MARTIN	Res.	1	1	2014	3481	1.69
04	2520	05	ZACH SPRINGER	Res.	1	1	2014	5339	1.18
04	2602	01	KIMBERLEE M SUMMERS	Res.	1	1	2014	2070	1.28
04	2615	00	PEACE LUTHERAN CHURCH	Church	1	1	2014	1347	0.23
05	2625	01	EA DYER	Res.	1	1	2014	0	0.00
04	2665	01	CITIZENS NATIONAL BANK	Com	1	1	2014	2393	0.53
04	2670	05	BOTTS TITLE	Com	1	1	2014	1558	0.53
02	2690	02	MISTY HORTON	Res.	1	1	2017	3703	0.28
04	2700	00	FIRST UNITED PENTECOSTAL	Church	1	1	2014	2596	0.83
04	2755	02	SMART FINANCIAL OPERAT	Com	1	1	2014	0	0.00
02	2940	03	ROGER BAGGERLY	RV	1	1	2014	7918	0.00
02	2965	07	ALMA WATSON	Res.	1	1	2014	1571	0.93
05	2990	03	HANNAH FOUNTAIN	Res.	1	1	2014	4382	1.98
05	3000	00	REX BARTLETT	Res.	1	1	2021	1830	0.66
05	3050	05	MACY MONTALVO	Res.	1	1	2014	13269	1.78
05	3335	03	MELANIE TODD	Res.	1	1	2014	3337	1.32
04	3380	02	ORBIT TIRES	Com	1	1	2014	1136	0.18
04	3387	01	3G FARM	Com	1	1	2014	2686	0.74
04	3391	02	QUALITY INN HPY LLC	Irrig	1	1	2014	24558	0.00
05	3480	00	ROCKDALE CHRISTIAN CH	Irrig	1	1	2014	0	0.00
05	3480	00	ROCKDALE CHRISTIAN CH	Church	1	1	2014	1054	0.70
05	3650	02	RONALD RABINOWITZ	Irrig	1	1	2014	0	0.00
05	3740	00	JUDITH MATULA	Irrig	1	1	2014	12600	0.03

2.2.2 Low Use Multi-Unit Accounts

Multi-family or trailer park low use accounts are always a concern. There are 2 accounts listed in the table below that are low use accounts. The property located at CGCB shows they serve 32 units. ***This needs to be verified and the meter needs to be replaced and probably downsized from a 4-inch. The register also shows more than 15.6 MG has passed through this meter.***

The Gibson property is listed as an apartment but shows only one unit being served. The class code or unit count may be wrong.

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LOW USE MULTI-UNIT ACCOUNTS

Mtr Rte	Account No.	Occupant No.	Name	class	No. Units	Mtr Size	Mtr Age	Lst Read kgal	2022 Kgal/M	2021 Kgal/M
04	2628	03	CGCB PROPERTIES, LLC	Apts	32	4	>10	15650	1.58	0.33
02	2962	01	JIM GIBSON	Apts	1	5/8	2021	268	1.44	1.19

2.2.3 Low Use Accounts– Declining Usage

There are 852 accounts that used less water in 2022 versus 2021 and 282 of those accounts were considered low use customers in 2022. The usage difference for these low use accounts totaled approximately 7.6 MGY. However, one account (Perry Builders) dropped usage by over 1 MG (Feb-2021). We assume that had to do with the arctic freeze that month and can skew the total declining usage.

A total of 97 of those low use declining usage accounts had at least a 1.5 Kgal/mo. decline in usage totaling a difference of 545 Kgal/Mo. A total 32 of these accounts were installed prior to 2015. A 1.5 Kgal/month drop in usage equates to over $200 per year in water and sewer commodity charges ($11.20/kgal). These accounts are listed below and need to be investigated to determine the reason for declining usage.

DECLINING USE 1.5 KGAL/MO OR GREATER – LOW USE ACCOUNTS

Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
04	2761	02	PERRY & PERRY BUILDERS	COM	1	2	2014	1,059	0.88	87.25	(86.4)
01	1630	04	YOUTH OPPORTUNITY INVES	COM	1	3	2014	9,397	0.18	82.26	(82.1)
04	3391	02	QUALITY INN HPY LLC	Irrig	1	1	2014	2,456	0.00	23.72	(23.7)
04	2461	00	ROCKDALE IND SCHOOL	SCH	1	4	>10	2,661	0.00	16.63	(16.6)
01	0285	01	ROCKDALE HISTOR SOCIETY	COM	1	5/8	2021	177	0.06	14.73	(14.7)
03	0745	98	JUDITH RUBIO HERNANDEZ	RES	1	5/8	2021	0	0.00	10.88	(10.9)
01	1040	01	TANGEE SELF	RES	1	5/8	2020	136	0.40	11.23	(10.8)
02	2940	03	ROGER BAGGERLY	RV	1	1	2014	792	0.00	10.33	(10.3)
05	0530	05	TERRY BLACKMON	RES	1	1	2014	1,080	0.15	9.38	(9.2)
01	1515	26	SUSAN YORK	RES	1	5/8	2021	47	1.43	10.30	(8.9)
01	1696	09	STACY C CLARK	RES	1	5/8	2020	124	1.78	9.91	(8.1)
04	2030	01	ARLISS RICHTER	RES	1	1	2014	601	1.51	8.91	(7.4)
01	0110	01	JYOTSHNA REED	COM	1	5/8	2021	0	0.00	6.40	(6.4)
03	1920	02	KAMIE FITZGERALD	RES	1	1	2021	565	0.00	6.31	(6.3)
04	1355	04	CARLOTA CAMBRON	RES	1	5/8	2021	56	0.35	6.60	(6.3)
02	1730	00	NEW HOPE BAPTIST CH	CH	1	5/8	2020	104	1.24	7.43	(6.2)
03	0395	04	LEONZO M LEPE	RES	1	5/8	2021	88	1.72	7.95	(6.2)
03	1145	13	REBECCA NINK	RES	1	5/8	2021	98	1.16	7.25	(6.1)
05	2970	01	DARLA ROSE	RES	1	5/8	2020	119	2.00	8.07	(6.1)
05	2965	00	DOROTHY LAWSON	RES	1	5/8	2021	86	1.44	7.31	(5.9)
02	1918	01	ELISSA BENFORD	RES	1	1	2020	78	1.01	6.77	(5.8)
01	0850	06	NORA JAIMES	RES	1	1	2014	847	1.15	6.95	(5.8)
01	1105	16	ERIC B VASQUEZ	RES	1	5/8	2021	33	1.96	7.58	(5.6)
04	1995	00	RICHARD GREEN	RES	1	5/8	2021	444	0.00	5.24	(5.2)
01	1915	00	CROCKER RECLAMATION	COM	1	5/8	2021	8	0.45	5.34	(4.9)
02	2235	00	PECAN CHURCH OF CHRIST	CH	1	5/8	2020	79	1.00	5.91	(4.9)
05	2085	02	LINDA DUBUISSON	RES	1	5/8	2014	312	1.61	6.27	(4.7)
05	0105	09	BREANNA BAILEY	RES	1	5/8	2014	714	1.95	6.58	(4.6)
02	0055	01	ROCKDALE FOOD MART	COM	1	5/8	2020	81	1.43	5.87	(4.4)
02	1830	06	NATHAN ROBERTS	RES	1	5/8	2021	36	0.31	4.14	(3.8)

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Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
04	2180	00	DIXIE WHITMORE	RES	1	5/8	2014	284	0.76	4.55	(3.8)
05	3385	00	PERRY & PERRY BUILDERS	COM	1	5/8	2021	65	0.79	4.63	(3.8)
04	2380	09	PATRICIA GUNN	RES	1	5/8	2019	175	1.64	5.39	(3.8)
02	2010	06	JEREMIAH JENNINGS	RES	1	5/8	2021	33	0.63	4.20	(3.6)
05	2265	18	EVELYN COPELAND	RES	1	5/8	2014	358	0.79	4.41	(3.6)
05	1210	01	JOANN DAVENPORT	RES	1	5/8	2014	357	0.00	3.48	(3.5)
03	1460	14	BRENDA MAYBERRY	RES	1	5/8	2021	60	1.92	5.42	(3.5)
01	0960	00	JOHNNIELYN BROWN	RES	1	1	2014	366	0.13	3.53	(3.4)
01	1445	98	SHADY GROVE RENT PROP	RES	1	5/8	2016	241	1.68	5.00	(3.3)
04	2745	04	GONZALES MEX BAR & GRIL	COM	1	5/8	2020	9	0.01	3.09	(3.1)
04	2520	05	ZACH SPRINGER	RES	1	1	2014	534	1.18	4.30	(3.1)
02	1394	18	ANTONIO CABRERA	RES	1	5/8	2020	54	0.97	3.96	(3.0)
01	1850	00	DORTHY THALER	RES	1	5/8	2015	140	0.17	3.05	(2.9)
03	2345	08	MELANIE D ROBERTS	RES	1	5/8	2021	38	0.79	3.73	(2.9)
03	1760	01	AMANDA K. WELLS	RES	1	1	2021	213	1.72	4.60	(2.9)
04	2650	03	LADONYIA YOUNG	RES	1	5/8	2016	286	1.79	4.70	(2.9)
05	1060	01	JESSENIA ROEMELIN	RES	1	5/8	2014	308	1.16	3.95	(2.8)
01	0160	00	PATTERSON LIBRARY	MUN	1	5/8	2021	24	0.00	2.68	(2.7)
05	1265	07	BETHANY COHEN	RES	1	5/8	2014	644	0.23	2.93	(2.7)
01	1825	01	MARY L WARE	RES	1	5/8	2021	20	0.72	3.43	(2.7)
05	1820	01	DEBORAH SIMS	RES	1	5/8	2014	289	0.79	3.45	(2.7)
03	0940	19	AMY HART	RES	1	5/8	2021	65	1.40	4.10	(2.7)
02	1600	98	AKSHAYA PATEL	RES	1	5/8	2015	226	1.59	4.18	(2.6)
04	2045	07	LANE PRAZAK	RES	1	5/8	2020	74	1.91	4.54	(2.6)
02	0695	02	ZACHARY BROOKS	RES	1	5/8	2020	44	0.73	3.18	(2.5)
05	1025	03	LINDA MCMAKIN	RES	1	1	2014	874	0.02	2.41	(2.4)
03	0730	04	VICKI GERRALD	RES	1	5/8	2021	22	0.03	2.43	(2.4)
05	2655	07	JOHN TOOMBS	RES	1	5/8	2013	256	0.25	2.63	(2.4)
05	2020	06	SUSAN M HAU	RES	1	1	2021	430	1.08	3.44	(2.4)
03	2035	00	MARY CALK	RES	1	5/8	2021	68	1.97	4.39	(2.4)
02	0675	04	GERMAN ANT VILLATORO	RES	1	5/8	2021	52	1.97	4.32	(2.4)
04	1730	98	STEPHEN JONES	RES	1	5/8	2014	261	0.19	2.49	(2.3)
04	0870	06	MICHAEL BRAGGS	RES	1	5/8	2014	474	1.40	3.73	(2.3)
04	3330	01	TEXAS ELECTRICAL SERVIC	COM	1	5/8	2019	50	0.75	2.90	(2.2)
03	2571	00	DOROTHY PRAZAK	RES	1	5/8	2021	17	0.87	3.02	(2.2)
03	1585	04	DANIEL GORMAN	RES	1	5/8	2014	573	0.74	2.83	(2.1)
03	2525	00	FRANK MONTELONGO	RES	1	5/8	2021	10	0.79	2.90	(2.1)
04	2116	03	ROCKDALE SPEEDY LUBE	COM	1	5/8	2020	51	1.17	3.25	(2.1)
03	2440	01	BILL MARTIN	RES	1	1	2014	348	1.69	3.76	(2.1)
01	0296	00	CITY OF ROCKDALE	MUN	1	1	2018	103	0.11	2.09	(2.0)
03	1300	98	NATE MCMANUS	RES	1	5/8	2021	21	0.53	2.56	(2.0)
03	2835	22	FAITH OLATUNJI	RES	1	5/8	2021	42	1.28	3.27	(2.0)
04	0350	01	DAVID TAYLOR	RES	1	5/8	2014	224	0.23	2.12	(1.9)
01	1080	07	GERALDINE WESTBROOK	RES	1	5/8	2020	46	1.10	2.99	(1.9)
05	2425	00	PAM KEVIL	RES	1	5/8	2014	567	0.00	1.82	(1.8)
05	2395	00	B C GREENSAGE	RES	1	5/8	2020	23	0.13	1.88	(1.8)
04	1100	00	ALYNE YOAKUM	RES	1	5/8	2014	173	0.18	1.98	(1.8)
03	2580	01	MISTY MCCOY	RES	1	5/8	2021	23	0.28	2.11	(1.8)
03	1040	01	ARNULFO LOZANO	RES	1	5/8	2020	31	0.43	2.18	(1.8)
01	1676	01	HARRY MCBRIDE,JR.	RES	1	5/8	2020	37	0.67	2.43	(1.8)
04	0695	01	CROSSROADS BIBLE CH	CH	1	5/8	2014	131	0.85	2.68	(1.8)
05	2400	06	ANTHONY SCOTT	RES	1	5/8	2021	11	1.11	2.91	(1.8)
01	1050	18	STACI BURLIN	RES	1	5/8	2021	32	1.28	3.03	(1.8)
04	0395	04	TAYLOR CONABLE	RES	1	5/8	2021	15	0.17	1.84	(1.7)
02	2690	02	MISTY HORTON	RES	1	1	2017	370	0.28	2.01	(1.7)
01	0445	07	DENISE STARNES	RES	1	5/8	2021	19	0.30	1.98	(1.7)
04	1845	06	CAROLINA ACEITUNO	RES	1	5/8	2020	17	0.01	1.58	(1.6)
05	0570	00	RUTH HANEY	RES	1	1	2021	222	0.15	1.73	(1.6)

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Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
01	0661	00	TIM ARLEDGE	RES	1	5/8	2021	2	0.17	1.76	(1.6)
01	1165	00	IGLESIA BAUTISTA	CH	1	5/8	2020	29	0.38	2.02	(1.6)
05	0740	00	BECKY PAGE	RES	1	1	2014	390	1.13	2.73	(1.6)
01	0940	10	JOHN REX	RES	1	5/8	2021	46	1.83	3.40	(1.6)
01	2090	01	TAYLOR AUTO CREDIT	COM	1	1.5	2014	82	0.00	1.52	(1.5)
04	2670	05	BOTTS TITLE	COM	1	1	2014	156	0.53	1.98	(1.5)
02	1371	11	MIKALYA WICKENS	RES	1	5/8	2020	36	0.89	2.43	(1.5)
02	0880	25	BRIANT FREEMAN	RES	1	5/8	2021	46	1.64	3.18	(1.5)
03	1485	12	LISA MCKAY	RES	1	5/8	2021	55	1.73	3.18	(1.5)

2.2.4 Apartment Units

The City needs to get an accurate count of apartment, trailer and RV park units being served. Total meter units served is a key component in tracking meter related issues such as sizing and proper application. There are 11 multi-unit accounts that indicate only one unit served. These accounts are listed below.

MULTI-UNIT ACCOUNTS THAT DO NOT LIST UNITS SERVED

Rte No.	Acct No.	Occ. No.	Name	Class Code	No. Unit	Mtr Sz	Mtr Age	Last Read Kgal	Kgal/M /Unit	2022 Total Kgal	2022 Kgal /M
2	1050	2	LOS ROBLES MHP	MH	1	4	2,020	4,360	168.25	2,019	168.28
4	4002	1	ROCKDALE REHAB	NUR	1	2	2,020	4,105	164.67	1,976	164.70
4	2628	3	CGCB PROPERTIES,	Apts	1	1	2,014	13,998	120.67	1,448	120.63
4	3394	0	SHADY GROVE RV	RV	1	2	2,014	9,052	96.92	1,163	96.94
4	3385	2	DAVID VELA	MH	1	2	2,014	8,859	61.25	735	61.26
4	3392	2	SHADY OAK RV	RV	1	2	2,014	3,997	49.17	590	49.19
2	203	1	KD45 HOLDIN RV	RV	1	1	2,014	4,169	40.08	481	40.08
2	1136	3	TEXTIN PROPERT	RV	1	1	2,014	485	12.92	155	12.88
4	1660	0	MCCAWLEY OAKS	Apts	1	1	2,014	395	5.50	66	5.53
2	2962	1	JIM GIBSON	Apts	1	1	2,021	27	1.42	17	1.44
2	2940	3	ROGER BAGGERLY	RV	1	1	2,014	792	0.00	0	0.00

2.2.5 Top Declining Usage Accounts

Section 2.2.3 of this summary listed low use declining accounts that had a reduced usage of at least 1.5 Kgal/month. Chapter three lists the top 100 declining use accounts regardless of meter size or class code. These accounts need to be investigated for meter accuracy issues. The following table lists 29 accounts whose consumption dropped by at least 10 kgal/month. A total of 16 of these accounts were installed prior to 2015. These accounts need to be investigated for meter accuracy.

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TOP DECLINING USE ACCOUNTS

Rte No.	Acct No.	Occu No.	Name	Class Code	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/ M	2021 Kgal/ M	Usage Change 2022-2021 Kgal/M
04	2761	02	PERRY & PERRY BUILDERS	COM	2	2014	1,059	0.88	87.25	(86.4)
01	1630	04	YOUTH OPPORTUNITY INVEST	COM	3	2014	9,397	0.18	82.26	(82.1)
04	1005	00	CITY OF ROCKDALE	MUN	2	>10	45,254	221.42	268.08	(46.7)
04	1669	01	O'REILLY AUTO ENTERPRISES,	IRRIG	1	2020	2,990	46.56	80.47	(33.9)
04	0391	01	WAL-MART STORES TEXAS, LP	IRRIG	2	2014	20,990	37.34	67.53	(30.2)
03	1681	00	JONATHAN MUSTON	RES	1.5	2014	1,086	5.49	29.96	(24.5)
04	3391	02	QUALITY INN HPY LLC	IRRIG	1	2014	2,456	0.00	23.72	(23.7)
03	1440	00	ROCKDALE IND SCHOOL	SCH	5/8	2021	113	9.68	31.47	(21.8)
02	0892	00	HUNTERS CHASE SENIOR APTS,	Apts	3	2022	6,632	156.09	173.83	(17.7)
01	1265	04	TINA GOLDEN	RES	5/8	2021	352	7.70	24.88	(17.2)
01	0825	01	DANA CAFFEY	RES	5/8	2019	356	2.79	19.57	(16.8)
04	2461	00	ROCKDALE IND SCHOOL	SCH	4	>10	2,661	0.00	16.63	(16.6)
04	3385	02	DAVID VELA	MH	2	2014	8,859	61.26	77.82	(16.6)
02	2679	01	MANUELA BARKER	RES	5/8	2021	337	5.95	22.34	(16.4)
02	1072	01	OM NILKHANTH NAMAH, LLC	COM	1	2019	2,828	66.78	81.48	(14.7)
01	0285	01	ROCKDALE HISTORICAL SOCIETY	COM	5/8	2021	177	0.06	14.73	(14.7)
04	2800	03	ORIENTAL KITCHEN	COM	5/8	2014	3,298	11.83	25.98	(14.2)
04	3020	01	ZIMMERMAN, MONA	Apts	1.5	2014	2,888	22.35	35.59	(13.2)
05	3820	00	ROCKDALE IND SCHOOL	SCH	3	2022	178	14.84	27.50	(12.7)
04	3394	00	SHADY GROVE RV PARK	RV	2	2014	9,052	96.94	109.60	(12.7)
02	1050	02	LOS ROBLES MHP, LLC	MH	4	2020	4,360	168.28	180.73	(12.5)
05	0485	00	RONALD MONTGOMERY	RES	1	2014	1,327	6.22	17.49	(11.3)
05	1605	02	SUGARFOOT ENTERPRISES TRU	RES	1	2014	1,885	6.07	17.13	(11.1)
05	1180	06	FILOMENA HENDERSON	RES	5/8	2014	846	7.13	18.16	(11.0)
03	0745	98	JUDITH RUBIO HERNANDEZ	RES	5/8	2021	0	0.00	10.88	(10.9)
01	1040	01	TANGEE SELF	RES	5/8	2020	136	0.40	11.23	(10.8)
02	2940	03	ROGER BAGGERLY	RV	1	2014	792	0.00	10.33	(10.3)
02	1775	02	EVETTE MICHELLE WILEY	RES	5/8	2021	126	4.52	14.58	(10.1)
03	2180	00	ROCKDALE LITTLE LEAGUE	MUN	2	2014	1,775	2.38	12.37	(10.0)

2.2.6 Meter Replacement Frequency

The City is in the process of starting to replace meters with the new AMI technology from drive by or AMR. Battery life consideration will be important in the selection process and is currently rated between 10 to 15 years depending on the vendor and product.

There are over 827 meters that were installed in 2014 or earlier, and 461 of the accounts are served with a 5/8x3/4-inch meter. As these older meters exceed 10 years of life, they will be candidates for replacement. Whether City goes with a mechanical meter or a static meter, it will be important that the metering component should equal the battery life.

2.2.7 Large Meter Testing

The following table summarizes 12, one-inch and larger meter accounts that generate at least $10,000 per year in commodity revenue. The combined commodity revenue from these accounts approximates $293,000 per year. Hypothetically, if a 2%-meter error occurred in these meters, the lost revenue would approximate $5,900 per year, versus

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approximately $3,600 for testing. At 1%-meter error the payback is still worth the testing cost and would still pay back the testing cost in approximately 15 months.

METERS THAT SHOULD BE TESTED ANNUALLY BASED ON COMMODITY REVENUE

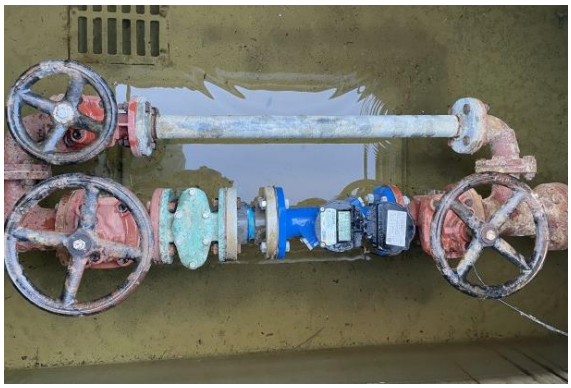
(1-INCH AND LARGER METERS)

Rte No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	2022 Kgal/M	Wnt Kgal/M	Comod $ Water/Yr	Comod $ Sewer/Yr	Comod $ Total/Yr
01	HOUSING AUTHORITY	Apts	60	3	2021	352.55	310.93	$32,784	$24,029	$56,813
04	T-N-T CARWASH	COM	1	2	2014	298.96	262.67	$27,614	$20,299	$47,913
04	ROCKDALE ESTATES & REHAB	NUR	1	2	2020	164.70	161.00	$14,660	$12,442	$27,102
02	LOS ROBLES MHP, LLC	MH	1	4	2020	168.28	148.23	$15,006	$11,455	$26,461
02	HUNTERS CHASE SENIOR APTS	Apts	80	3	2022	156.09	142.73	$13,829	$11,030	$24,859
04	CGCB PROPERTIES, LLC	Apts	1	1	2014	120.63	110.60	$10,408	$8,547	$18,955
04	FALLS CAPITAL INC.	COM	1	1	2021	101.80	113.87	$8,592	$8,800	$17,392
02	DAYS INN	COM	1	2	2014	105.46	107.30	$8,945	$8,292	$17,237
04	SHADY GROVE RV PARK	RV	1	2	2014	96.94	111.37	$8,123	$8,607	$16,730
04	ROCKDALE INN MOTEL	COM	1	2	2021	109.69	74.63	$9,353	$5,767	$15,120
04	GILL'S BUDGET INN	COM	1	2	2014	75.69	93.70	$6,072	$7,241	$13,313
01	ROCKDALE APARTMENTS	Apts	27	2	2021	82.03	56.43	$6,684	$4,361	$11,045

2.2.8 Meter Vaults

The City needs to consider new meter vaults at the time large meters are changed out. The new vault and meter installations need to include test plugs, strainers, backflow prevention appurtenances (if needed) and bypass lines (if possible) along with accessible valves (Chapter 3 Section 3.14). Chapter and section 3.14.6 list the results of the inspections and several accounts have problems that have been commented on. For instance, the meter located in the City Yards has a broken register. Although a non-revenue meter, its usage needs to be accounted for. A revenue meter located at Rockdale high school has a broken register (Acct No. 04-2461-00).

Of the 12 meters found in a meter box installation, all were found to be too small for the application. Most are in poor condition, warped meter box, badly fitting cover. Most of these are of plastic construction. The meter box approach for these large meters is questionable since it does not readily provide full access to the meter assembly.



The City should lock or chain off all bypass lines, so a bypass line is not opened without the City knowledge. The following is an example at Hunter Chase Apartment complex. However, the meter vault and installation is considered to be good. Valves are visible and there is adequate working area in the vault. As can be seen in the photo, a strainer exists upstream of the meter which is good.

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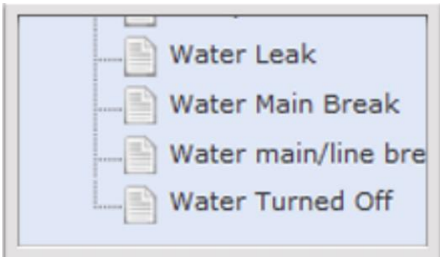
2.3.1 Operations and Maintenance - Improvements Work Order Entry

The City of Rockdale would benefit greatly from further improvements to its work order entry and reporting system. In particular,

a) Software tools to expedite capture in the field and in the office should lead to more accurate data collection and improved efficiency.
b) A specific field for leak repairs. Some work order applications offer “templates” for different categories of work order, by department, as well as by task.
c) Provide for the capture of the reported leak’s fundamental data (or other tasks) at one time, providing a printed, formatted work order for the assigned crew.



d) In addition to data currently captured, dedicated fields should include:

• Subdivision or Pressure Zone	• Full Street Address
• Activity Description (i.e. repair/replace)	• Cause of Leak
• Leak Type (Main, Service, Meter, Hydrant, etc.)	• Leak dimensions
• Pipe Size	• Leak run time
• Pipe Material	• Leak volume estimate

e) The system should be configured to reconcile with materials inventory to better manage and control parts and materials utilization, reordering and materials assignment.
f) We recommend periodic training for all personnel in the utilization of the City work order system to ensure best practices at all times by all users.
g) The Public Works department should ensure correct implementation and to update the system appropriately to ensure ease of use that expedites full system utilization.

2.3.2 Work Order Data-Base Recommendations

Specific recommendations for the work order data-base include:

a) Evaluate current status and make necessary improvements to existing work order system to enable incorporation of detailed leak repair data and accurate location data into the City's IAMGIS system.
b) If the IAMGIS system is to be utilized to capture work order history, staff need to be assigned to this task to fully implement this system’s capabilities.
c) Improve existing fields and capture process to include leak volume assessment to facilitate accounting for volumes of Real Losses for repaired leakage.
d) Where hydrant flushing is necessary to complete a leak repair, this water use should be considered Real Loss as it is associated with leakage.

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e) Where hydrant flushing is for other operational or water quality purposes, continue to track this water use as authorized unmetered-unbilled water use and to be assessed accordingly in the monthly and annual NRW water balance.
f) Standardize nomenclature of sub-divisions and streets (or use specific codes for each name) to avoid free text misuse. Ensure their implementation.
f. Limit the use of free text in work order data capture by the use of pop-up or pull-down menus for capture of frequently used items.

2.3.3 Water Loss Calculations

Implement improved water loss calculations for the repaired leaks as indicated in Chapter 5.2.5. We recommend that any calculator be initially crosschecked on site so that the City discovers its own confidence level attributable to the method. Often calculators, being theoretical and dependent on field measurements, can over-estimate the actual loss.

2.3.4 Facilitate Data Work Order Capture

Ensure ease of capture of work order by maintenance crews in the field, as well as in the database at the office. By simplifying the data capture, field personnel will be encouraged to fully complete all form details.

2.3.5 Tracking Repair Location In GIS

Implement repair location tracking in a work order system and IAMGIS. Update annually and monitor results for leak incidence on specific water mains/streets as outlined in the report and especially those remaining areas of the system with old cast iron (CI) and asbestos cement (AC) mains. The goal should be to identify in detail the sections of water main with high leak incidence that should be scheduled for leak detection and/or pipe replacement.

2.3.6 High Leak Incidence Areas

Specific areas already identified with high leak incidence should be scheduled for on-going leak detection survey operations each year with the goal of reducing the buildup of non-visible leaks. This is a targeted activity that the City of Rockdale can do in-house, with the appropriate training and equipment, or alternatively by contract services.

- *In-house program equipment costs: $25,000 to 40,000 (start-up)*
- *In-house program personnel costs: Minimum 1 fully trained technician, plus supervisor. Approximately $55,000 per year (plus overhead).*

- *Contract leak detection program (3 year program): Up to 20 miles/year at $500.00/mile*

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2.3.7 Prioritize Old Water Mains for Replacement

Continue with DWSRF Phases 1 & 2 of pipeline replacement project. Identify remaining water lines of old, small diameter cast iron and AC pipe. These should be given priority for replacement or elimination. These old water mains contribute significantly to on-going leaks in the system and impact distribution system efficiency. Aside from the cost benefit of reduced maintenance and water loss, there is a further benefit in terms of water quality (elimination of corroded pipe), improved hydraulic distribution pressure and a consequent drop in pipe flushing activities.

2.3.8 Non-Revenue Water Use Data Capture

Refine and improve data capture of non-revenue water (complete data collection and accuracy). Continue to monitor all flushing operations. The City's flush logs need to be fully utilized every month to track all flushing operations whether for leak repair, water quality or O&M purposes. Usage assessments need to be improved to ensure accuracy of totals included in the monthly operating reports.

2.3.9 Procedures for Estimating Water Losses

With an emphasis on accuracy of data, implement procedures for estimating water losses and implement verification of estimates of water loss/use for all leaks, tank overflows, flushing operations and other authorized water use (unbilled-unmetered use). See Sections 4.4 and 4.5.

2.3.10 Tracking of Unauthorized Unmetered Use

Implement tracking of unauthorized unmetered use, whether from hydrants or illegal connections, tampering, etc.

2.3.11 Fire Department & Hydrant Flows

The City needs to ensure that the local Fire Department continues to contribute to the optimum management of Rockdale's water resources by providing monthly reports of all authorized unmetered-unbilled water use (hydrant flows).

2.3.12 Summary of Maintenance Operations & Water Use

The following table provides a suggested approach to the kinds data that need to be collected every month in a Summary Report (spreadsheet). By improving the data fields to be captured in the work order system, this approach would go a long way towards accurate accounting of all authorized unmetered use as well as leakage assessments.

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SUGGESTED ANNUAL SUMMARY OF MAINTENANCE OPS & WATER USE

#	Work Order Line Item	Jan-18	Feb-18	Mar-2018, etc.
1.1	Water Main Repair	454	431	
1.2	Water Service Repair	215	219	
1.3	Meter Leaks			
1.4	Other Leak Repairs			
1.5	Storage Tank Overflows			
2.1	Leak Detection			
2.2	Fire Hydrant Repair/Main			
2.3	Fire Hydrant Replaced			
2.4	Valves			
2.5	Fire Flow Test			
2.6	Flush Dead Ends			
3.1	W.W. Main Repair			
3.2	W.W. Service Repair			
3.3	W.W. Manholes			
3.4	Other			
4.1	Meter Shop Calls			
5.1	Water Connections			
5.2	WW Connections			
5.2	WW Elder Valves			
	Total Activity			
	Operational Water Uses (Gallons):			
6.1	Flush Dead End Mains			
6.2	Storage Tank Flushed			
6.3	Water Breaks Estimates			
6.4	Storage Tank Overflows (estimates)			
6.5	Sewer Cleaning			
6.6	Hydrant Flushing-Fire Flow			
6.7	City of Round Rock*			
6.8	Round Rock FD			
6.9	City Construction			
6.10	Construction-Contractors**			
	Total			

** If City use is 100% recorded through meters, then no entry here*

*** If contractor use is 100% monitored through use of hydrant meters, then no entry here*

2.3.13 Hydrant Operating Procedures

Hydrant leaks are often the consequence of hydrant use by the local Fire Dept. (flushing operations) and occasionally by contractors. Although the incidence of hydrant leak repairs in the work order data is low, training in correct hydrant operating procedure is recommended to reduce the incidence of these leaks. When hydrants are used by contractors, the City should assign a crew to open and close these valves and ensure a complete shutdown (no leaking drain valve).

2.3.14 Infrastructure Leakage Index (ILI) Goals

Based on the water balance data presented in Chapter 4.9.2, the Infrastructure Leakage Index (ILI) for the City is at 2.29 and considered good. With the improvements suggested in this report, this indicator can be maintained below 2.0 over the next 3 to 5 years. The City should set the goal to achieve an on-going target ILI within this range. This can be achieved by aggressive and pro-active implementation of the suggestions and recommendations in this report. All implemented programs should be monitored for results and improvements each year.

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3.0 DEFINITIONS

Allowable Leakage - Synonymous with the term **Unavoidable Annual Real Losses** (UARL). The volume of water that inevitably leaks from the pipe joints in a well-maintained underground water distribution system. The amount of allowable leakage is determined in part by the age of various system components, pipe characteristics and system working pressures. Not all leaks are cost effective to find and repair. Consideration must be made for some small leaks that must be located due to other needs (property damage, liability or risk issues).

The UARL is considered a theoretical reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a key variable in the calculation of the Infrastructure Leakage Index (ILI).

Annualized Records - A running 12-month cumulative total of data. In this context, usually relating to water sales, distribution and production.

Kgal - Unit of 1,000 Gallons.

Infrastructure Leakage Index (ILI) - This indicator is considered a measure of the water utility's effectiveness in leakage management and is a dimensionless indicator for comparing performance among water utilities. The lower the value of the infrastructure leakage index (ILI), the closer the utility is operating at the theoretical low level of the UARL.

Living Unit Equivalence (LUE) – This number is an estimated extrapolation of total accounts, which is based on the average monthly consumption of residential accounts. The average consumption of 1-inch and larger accounts is divided by the average consumption for residential single family accounts and multiplied by the number of large meter accounts.

Metered Ratio (MR) – Ratio of the total amount of water sold or otherwise distributed through meters to the total amount of water produced, often expressed as a percentage.

Non-Revenue Usage - Volume of water legitimately distributed for non-revenue generating end uses such as line flushing, fire department operations and training, parks and recreation, sewer line and street cleaning, and water and wastewater treatment, etc. PUB accounts are metered and are reflected in the sales volume.

Non-Revenue Water (NRW) - Apparent and Real Losses - Un-metered and undefined water losses such as those losses resulting from meter inaccuracy and/or misapplication, underground leakage, un-metered connections, theft, inaccurate record keeping and billing. **Apparent losses** as part of this definition, refers to water loss associated with metering error, meter reading, billing, unauthorized consumption, etc., and **Real Losses** refers to water loss associated with the physical leakage component of NRW.

Real Losses (Underground Leakage) - Water loss that occurs through leaks and breaks in underground main lines, service lines and fittings. Water loss associated with metering is defined as **Apparent Losses** by AWWA.

Theoretical Life Expectancy (TLE) - The time period in years that given water meter is expected to function accurately. The variable factors affecting meter life expectancy are meter and water quality, and the amounts and rates at which water is delivered through a meter.

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Unauthorized Consumption - Usually refers to unauthorized water taken from fire hydrants, open bypass lines, un-metered fire lines, meter tampering and through illegal connections.

JBS Water, Inc.
Houston, Texas
January 2023

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FINAL REPORT

COMPREHENSIVE WATER DISTRIBUTION & METER MANAGEMENT AUDIT

City of Rockdale, Texas

December 2022

CHAPTER 2

WATER PRODUCTION & THE METERED RATIO

Chapter 2

CITY OF ROCKDALE, TEXAS
WATER AUDIT & METER MANAGEMENT AUDIT

2. WATER PRODUCTION & METERED RATIO

2.1 INTRODUCTION

The City of Rockdale obtains its raw water from two well fields comprised of five operational wells. The raw water from the Airport well field is delivered to the City's Mill Street Water Treatment Plant (WTP), about one and a half miles away. In early December 2022 the WTP was taken off-line for infrastructure rehabilitation. Currently all water is drawn from the Texas Street Well Field and Booster Station. This water audit began with data collection and field inspections in late October.

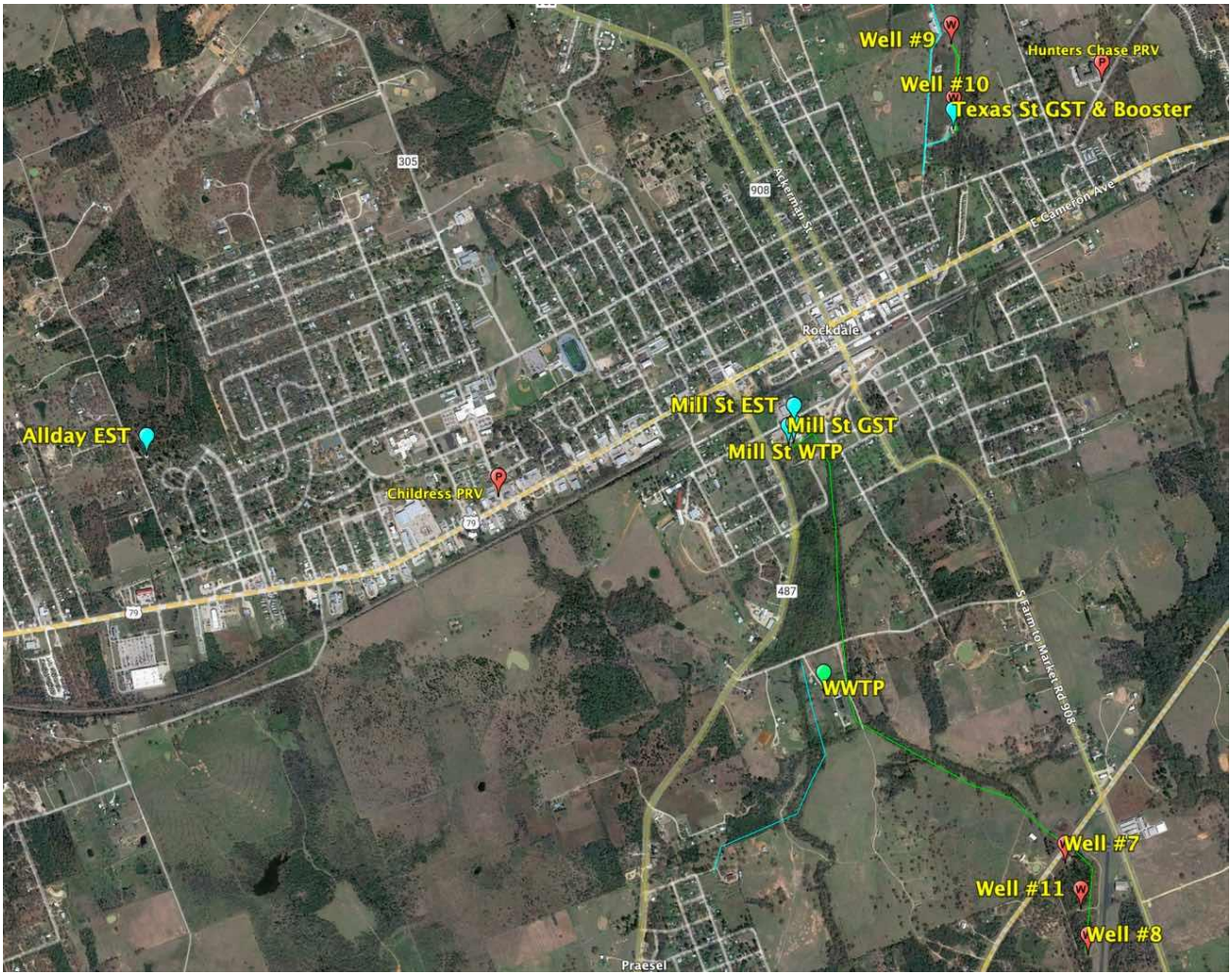

Figure 1 Rockdale Wells & Storage Tanks

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Under normal operations, the treated supply from the Mill St WTP is pumped to the low pressure system via one 12-inch Finish Water line and is metered before exiting the WTP facility. A recently installed Siemens mag meter provides a digital readout. Its signal output is returned to the WTP control center where can be checked daily on the control room display (gpm only). It is anticipated that the rehabilitation project includes updates to the SCADA system software and meter instrumentation. Flows from the Texas Street wells are treated and stored in the Texas ground storage tank (GST) and then pumped via the booster station to the high pressure zone (Allday EST).

Figure 2 Texas Well Field, GST & Effluent Meter

Figure 3 Texas GST & Booster Station

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Texas well water entering the GST is treated before storage and metered on the 12-inch outflow line with a Siemens mag meter (display in the control room).

The following table summarizes the locations of the production meters:

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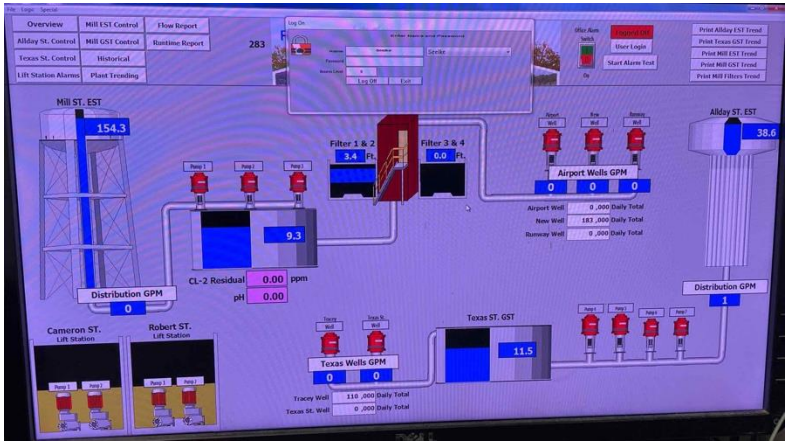
2.1.1 RAW & FINISH WATER METER INSTALLATIONS

#	Plant	Name	Location Address	Type	Line Size	Meter Size	Meter Type	Serial #	Mfr.	Model
1	Airport WF	Well #7-Airport	To right of airport rear entrance gate near Hwy 77.	Raw	8”	8"	Propeller	2022-0600-08	McCrometer	Wtr Specialties Propeller
2	Airport WF	Well #11-Airport	To right of airport runway 720 ft to S of Well #7.	Raw	8"	6"	Propeller	0140109-06	McCrometer	Wtr Specialties Propeller
3	Airport WF	Well #8-Runway* (well off line due to electrical problem)	By airport runway 625 ft S of Well #11.	Raw	8"	8"	Propeller	970054-08	McCrometer	Wtr Specialties Propeller
4	Mill St WTP	Raw Water Inflow	Inside treatment building.	Raw	12"	12"	Propeller	NA	Sparling	102/182
5	Mill St WTP	Finish Water Outflow	In vault on booster pump outflow line.	Finish	12"	12"	Mag	N1HN040276	Siemens	FM Mag 5000
6	Texas WF	Well #9-Tracy	1,100 ft N of Well #10	Raw	6"	6"	Propeller	982599-6	McCrometer	Wtr Specialties Propeller
7	Texas WF	Well #10-Texas	200 ft N of Texas GST	Raw	6"	6"	Propeller	20012689-6	McCrometer	Wtr Specialties Propeller
8	Texas GST	Raw Water Inflow	Texas St Water Plant	Raw	12”	12”	Propeller	NA	Sparling	102/182
9	Texas GST	Finish Water Outflow	Texas St Water Plant	Finish	12”	12”	Mag	N1HN040251	Siemens	FM Mag 5000



The meters are connected to the City’s SCADA system at the Mill Street Plant where flow rates and total volumes are recorded. However, at Mill Street the outflow meter (mag) is currently reporting a system failure and is in need of servicing. The raw water influent meter to Mill Street is beyond repair and is pending replacement as part of the plant rehabilitation. Completion of Mill St rehabilitation project is expected by January 31 2023. During the project the Airport wells will be offline and the system will depend on supply from the Texas Street wells and pump station.

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2.2 RAW AND FINISH WATER TOTAL VOLUMES

The City has had a history of issues with the plant outflow meters; recorded totals have been collected intermittently. Consequently, water production records are based on well meter totals, read daily.

Since the City's baseline production data is from the five active wells, the following table shows the monthly water production totals recorded for each well from January 2019 to December 2022. Well #8 is currently off line.

GROUND WATER PRODUCTION 2019-2022

	AIRPORT WELLS				TEXAS WELLS			ALL WELLS
Mo/Yr	#11	Airport	Runway	Total	Tracy	New Texas	Total	TOTAL (KG)
Jan-19	11,820	0	0	11,820	8,236	1,169	9,405	21,225
Feb-19	7,537	0	0	7,537	5,510	4,177	9,687	17,224
Mar-19	13,152	0	0	13,152	181	6,568	6,749	19,901
Apr-19	11,911	0	0	11,911	0	6,856	6,856	18,767
May-19	12,531	0	0	12,531	3	9,030	9,033	21,564
Jun-19	13,432	0	0	13,432	0	9,055	9,055	22,487
Jul-19	14,318	148	22	14,488	4	10,584	10,588	25,076
Aug-19	356	18,735	4	19,095	0	16,058	16,058	35,153
Sep-19	205	17,466	5	17,676	0	12,119	12,119	29,795
Oct-19	1	13,932	-1	13,932	0	9,421	9,421	23,353
Nov-19	523	15,727	2	16,252	0	2,948	2,948	19,200
Dec-19	12,076	1,102	0	13,178	0	5,110	5,110	18,288
Jan-20	9,441	-2	1	9,440	0	6,818	6,818	16,258
Feb-20	8,733	174	0	8,907	1,823	6,131	7,954	16,861
Mar-20	7,929	-3	1	7,927	0	9,623	9,623	17,550
Apr-20	6,666	109	0	6,775	0	11,865	11,865	18,640
May-20	10,156	-2	2	10,156	0	11,326	11,326	21,482
Jun-20	12,164	-1	1	12,164	775	13,945	14,720	26,884
Jul-20	12,534	4,626	0	17,160	2,516	9,793	12,309	29,469
Aug-20	8,424	7,330	0	15,754	8	12,766	12,774	28,528
Sep-20	4,061	6,630	6	10,697	6	9,889	9,895	20,592
Oct-20	8,859	6,226	4	15,089	590	5,878	6,468	21,557
Nov-20	6,482	266	1	6,749	6,614	7,900	14,514	21,263
Dec-20	7,591	-3	1	7,589	5,368	5,848	11,216	18,805
Jan-21	8,559	-2	0	8,557	6,644	5,310	11,954	20,511
Feb-21	8,154	-1	2,669	10,822	6,333	9,896	16,229	27,051
Mar-21	4,487	-1	4,702	9,188	1	12,199	12,200	21,388
Apr-21	4,944	0	5,162	10,106	282	11,711	11,993	22,099
May-21	4,573	0	5,641	10,214	4	11,145	11,149	21,363
Jun-21	5,851	0	5,809	11,660	2	11,880	11,882	23,542
Jul-21	5,502	0	5,028	10,530	1,519	11,735	13,254	23,784
Aug-21	8,761	0	7,644	16,405	1,521	10,822	12,343	28,748
Sep-21	8,924	0	9,798	18,722	2,151	6,997	9,148	27,870

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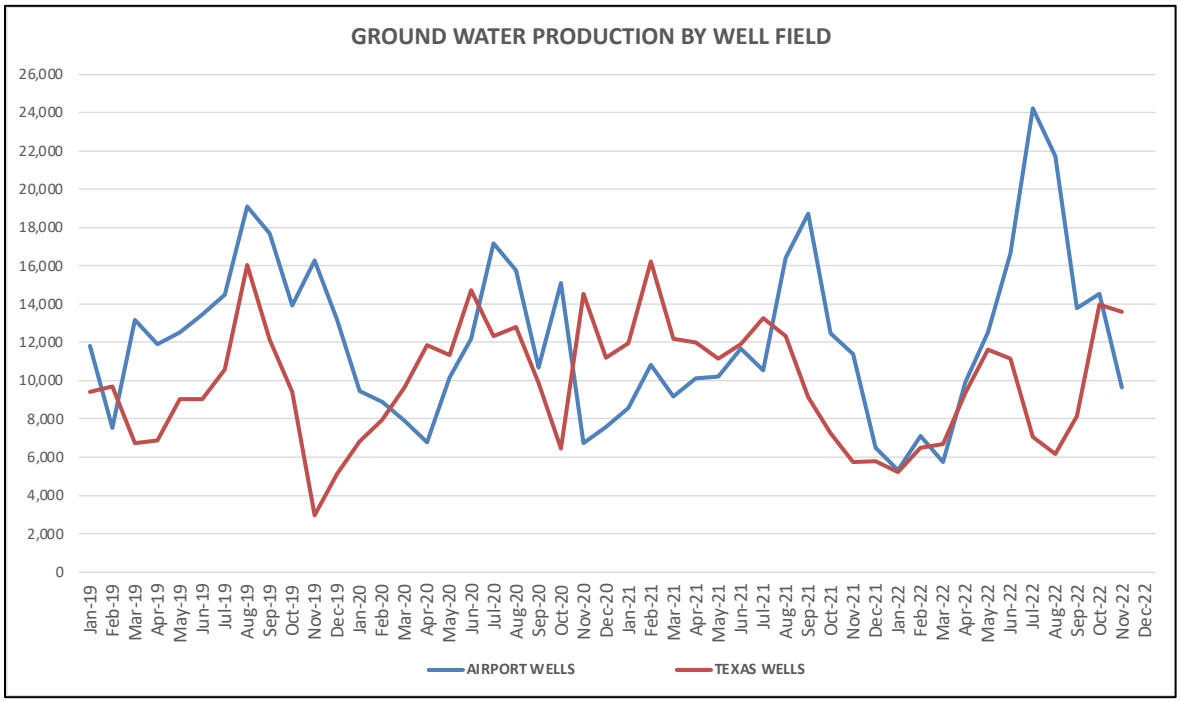
	AIRPORT WELLS				TEXAS WELLS			ALL WELLS
Mo/Yr	#11	Airport	Runway	Total	Tracy	New Texas	Total	TOTAL (KG)
Oct-21	6,399	0	6,071	12,470	372	6,862	7,234	19,704
Nov-21	11,365	2	2	11,369	0	5,724	5,724	17,093
Dec-21	6,450	31	4	6,485	534	5,261	5,795	12,280
Jan-22	5,299	3	2	5,304	0	5,205	5,205	10,509
Feb-22	7,091	3	7	7,101	0	6,490	6,490	13,591
Mar-22	5,762	0	1	5,763	179	6,483	6,662	12,425
Apr-22	9,945	0	1	9,946	33	9,326	9,359	19,305
May-22	12,504	5	5	12,514	11	11,629	11,640	24,154
Jun-22	13,407	3,249	11	16,667	3,527	7,635	11,162	27,829
Jul-22	11,075	13,127	1	24,203	5,198	1,883	7,081	31,284
Aug-22	10,552	11,187	2	21,741	6,172	0	6,172	27,913
Sep-22	6,936	6,844	3	13,783	1,850	6,277	8,127	21,910
Oct-22	7,576	6,945	0	14,521	796	13,169	13,965	28,486
Nov-22	4,846	4,805	2	9,653	3,943	9,653	13,596	23,249
Dec-22	1,006	409	1	1,416	6,351	18,191	24,542	25,958
2022 Totals	**95,999.0**	**46,577.0**	**36.0**	**142,612.0**	**28,060.0**	**95,941.0**	**124,001.0**	**266,613.0**

*Data as reported by City (no adjustments). On Dec 6 2022 the Airport wells were taken off line.

Annualized reported well production through November 2022 is 266,613 Kgals.



The following table presents well water production for 2022 adjusted according to the well meter test results to show the impact on overall production for the last 12 months through November. Based on test results annualized well production through December 2022 is assessed at 239,172 Kgals, showing approximately 27,440 Kgals less for the year over the reported volumes.

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This is a somewhat hypothetical scenario as we do not know how long the meter errors have been in progress. *It is likely that actual over registered volumes are lower than the table suggests.* The Airport well came online in June with a new meter, with no accuracy error.

ADJUSTED GROUND WATER PRODUCTION 2022

	AIRPORT WELLS				TEXAS WELLS			ALL WELLS
Mo/Yr	#11	#7 Airport	#8 Runway	Total	Tracy	New Texas	Total	TOTAL (KG)
Jan-22	4,769.6	0.0	0.0	4,769.6	0.0	4,326.7	4,327	9,096.3
Feb-22	6,382.5	0.0	0.0	6,382.5	0.0	5,394.8	5,395	11,777.3
Mar-22	5,186.3	0.0	0.0	5,186.3	168.7	5,389.0	5,558	10,744.0
Apr-22	8,951.4	0.0	0.0	8,951.4	31.1	7,752.3	7,783	16,734.8
May-22	11,254.7	0.0	0.0	11,254.7	10.4	9,666.7	9,677	20,931.8
Jun-22	12,067.5	3,249.0	0.0	15,316.5	3,324.2	6,346.6	9,671	24,987.3
Jul-22	9,968.5	13,127.0	0.0	23,095.5	4,899.2	1,565.3	6,465	29,560.0
Aug-22	9,497.7	11,187.0	0.0	20,684.7	5,817.2	0.0	5,817	26,501.9
Sep-22	6,243.0	6,844.0	0.0	13,087.0	1,743.6	5,217.8	6,961	20,048.4
Oct-22	6,819.1	6,945.0	0.0	13,764.1	750.2	10,946.8	11,697	25,461.1
Nov-22	4,361.8	4,805.0	0.0	9,166.8	3,716.3	8,024.1	11,740	20,907.2
Dec-22	905.5	409.0	0.0	1,315.5	5,985.9	15,121.4	21,107	22,422.8
2022 Total	**86,407.6**	**46,566.0**	**0.0**	**132,973.6**	**26,446.8**	**79,751.5**	**106,198.3**	**239,171.9**

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2.3 PRODUCTION METER TEST RESULTS

We have tested each active well meter for accuracy on site. The test consisted of a comparison of recorded flows between the well or plant meter and portable ultrasonic test meter. Airport Well #8 could not be tested as it is off line. The Mill St outflow meter could not be tested as it is pending service by the manufacturers' rep. The raw water inflow meters at Texas and Mill St were not tested at this time.

In order to conduct these tests, suitable access to the pipe on the well discharge line is required. In Rockdale all production meters provide sufficient accessible space for installation of the test equipment. The following table summarizes production meter accuracy following our tests.

SUMMARY OF 2022 PRODUCTION METER TEST RESULTS

City Meter	City Meter Gallons	Test Meter Gallons	% Var.	Observations
Well #7-Airport	5,000	5,035	99.3%	New meter in 2021; meter accurate.
Well #11-Airport	7,500	6,750	111.1%	Tested twice, appears to be over registering.
Well #8-Runway	No Test	No Test	na	Well out of service.
Raw Water Inflow (Mill St Plant)	No Test	No Test	na	Old meter out of service, pending replacement.
Finish Water Outflow (Mill St Plant)	No Test	No Test	na	Meter instrumentation reports errors
Well #9-Tracy	4,000	3,771	106.1%	Old propeller meter, appears to be over registering.
Well #10-Texas	7,000	5,830	120.1%	Significant over registration.
Raw Water Inflow (Texas St Plant)	No Test	No Test	na	Old propeller meter needs calibration or replacement.
Finish Water Outflow (Texas St Plant)	4,100	4,003	102.4%	Meter in good condition, stable accuracy.

The following tables and charts review the results of the testing process.

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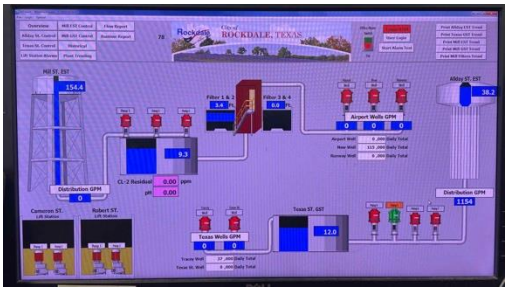
2.3.1 MILL STREET WTP FINISH WATER METER

	GPM Recorded			Observations
	WTP Meter gpm	**Test Meter gpm**	**% Var.**	
Test #1	NA	NA	NA	There is a good quality Mag meter installed 3 or 4 years ago. The meter instrumentation is failing and needs service by manufacturer's rep.



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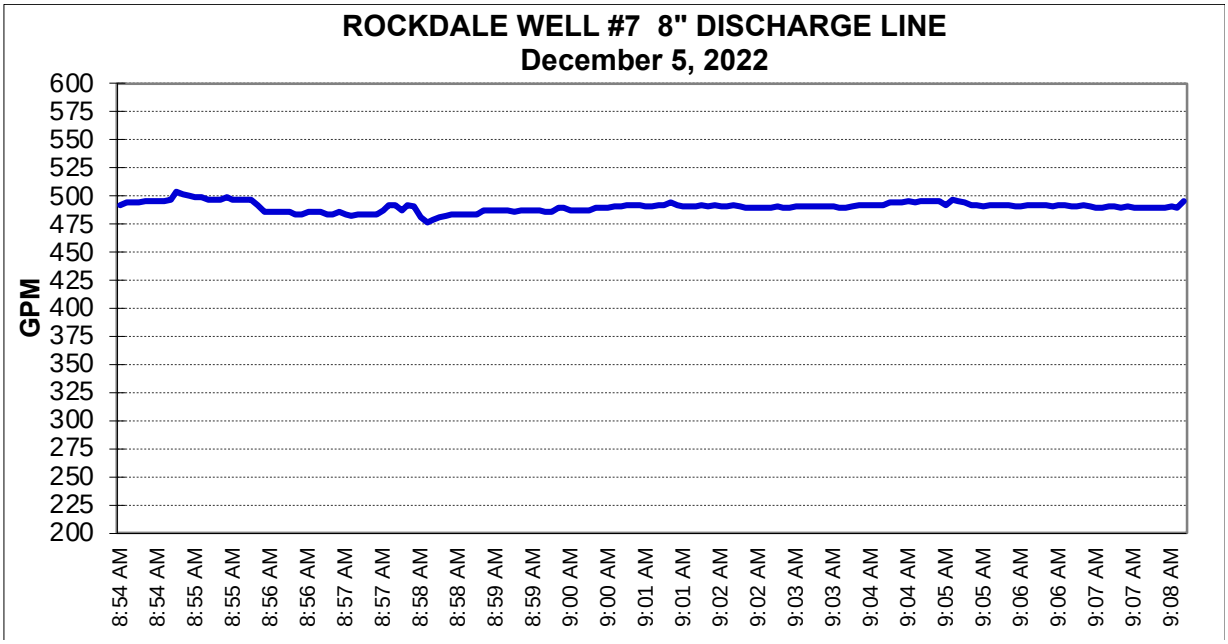
2.3.4 WELL #7 METER (AIRPORT)

	Gallons Recorded			OBSERVATIONS
	Well Meter	**Test Meter**	**% Var.**	
Test #1	5,000	5,035	99.3%	Nominal test at 490 gpm. Meter appears accurate. New meter in late 2021.



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2.3.5 WELL #8 METER (RUNWAY)

Gallons Recorded				OBSERVATIONS
	Well Meter	**Test Meter**	**% Var.**	Serial number suggests meter over 10 years old.
Test #1	No Test	No Test	na	Well out of service due to on-going electrical issue.

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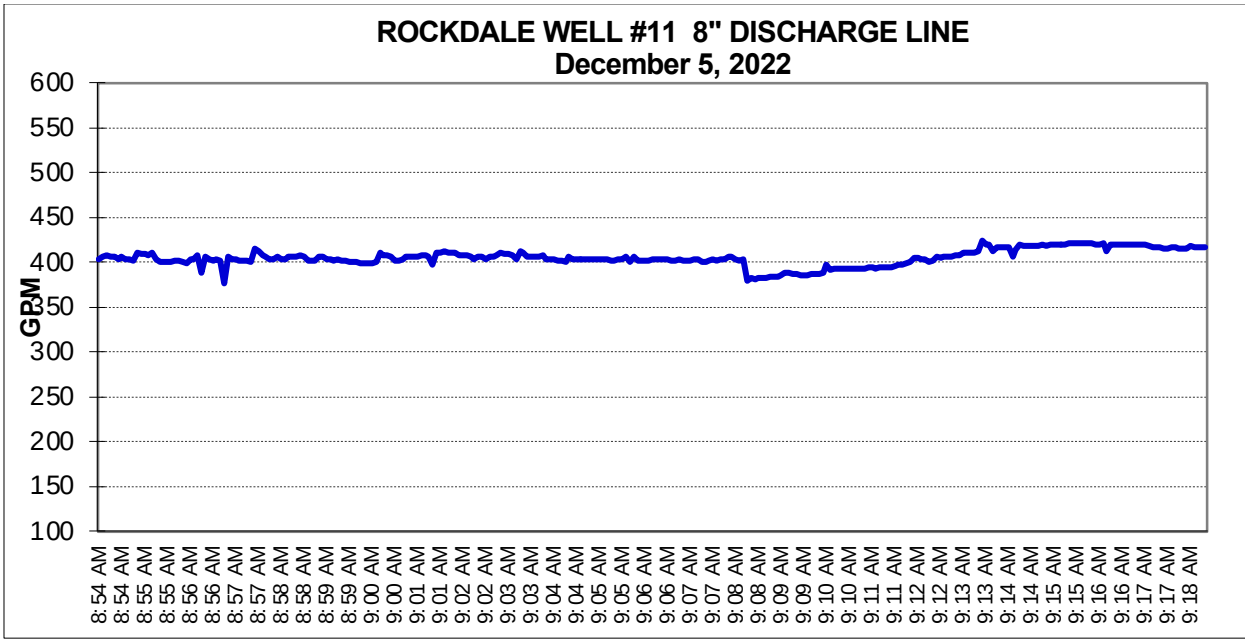
2.3.6 WELL #11 METER (AIRPORT)

	Gallons Recorded			OBSERVATIONS
	Well Meter	**Test Meter**	**% Var.**	Serial number suggests meter over 10 years old.
Test #1	4,500	4,041	111.4%	Meter appears to be over registering. Meter needs calibration.
Test #2	3,000	2,709	110.7%	Second test on new location on well discharge. Test confirms over registration.



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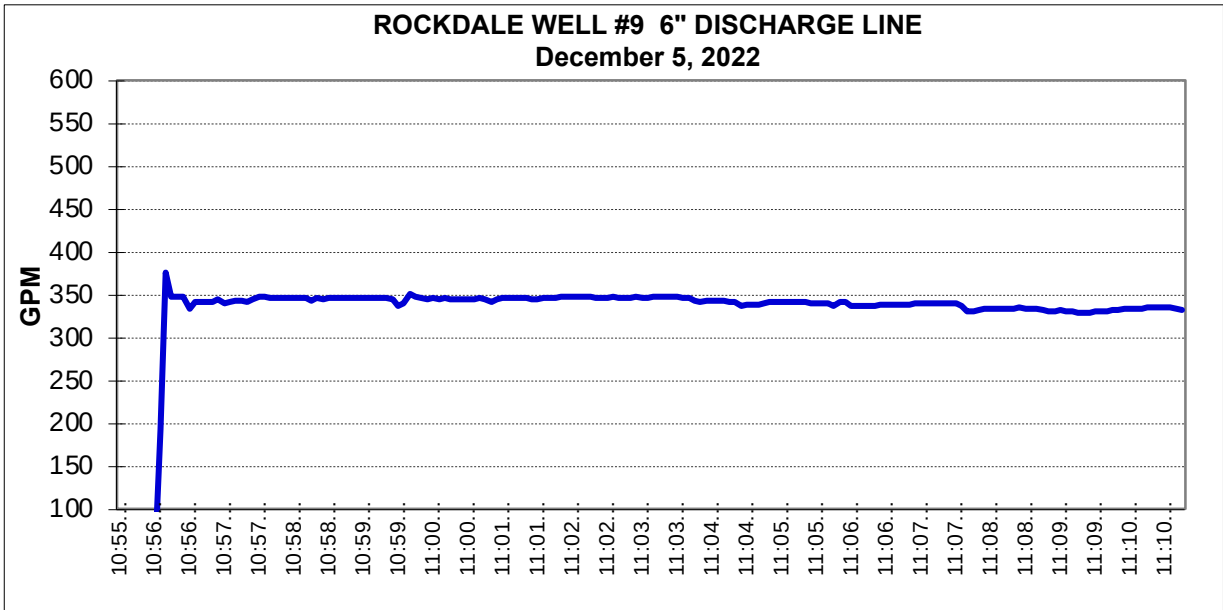
2.3.7 WELL #9 METER (TEXAS ST-TRACY)

	Gallons Recorded			OBSERVATIONS
	Well Meter	Test Meter	% Var.	
Test #1	4,000	3,771	106.1%	Test meter downstream of installed meter. Nominal test: meter appears to over register 6%. Meter needs calibration. Moderate flow velocities (~3.8 ft/s);



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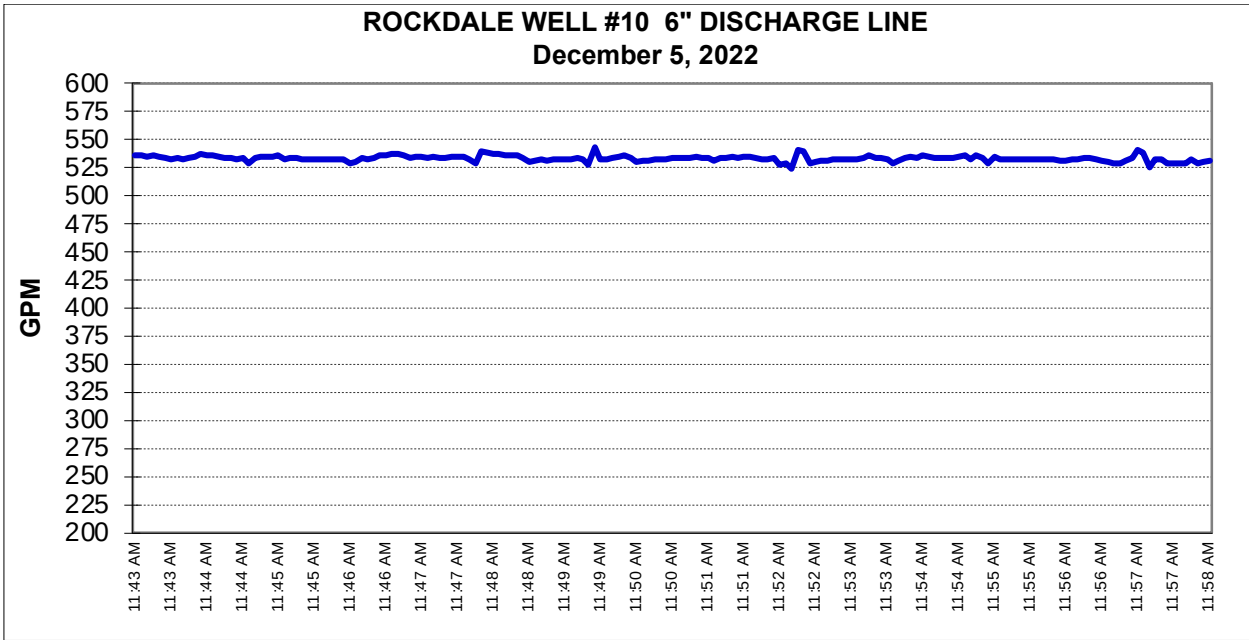
2.3.8 WELL #10 METER (TEXAS ST)

	Gallons Recorded			OBSERVATIONS
	Well Meter	Test Meter	% Var.	
Test #1	7,000	5,830	120.1%	Significant over registration (+/- 20%). Meter needs calibration. Moderate flow velocities (~5.9 ft/s);



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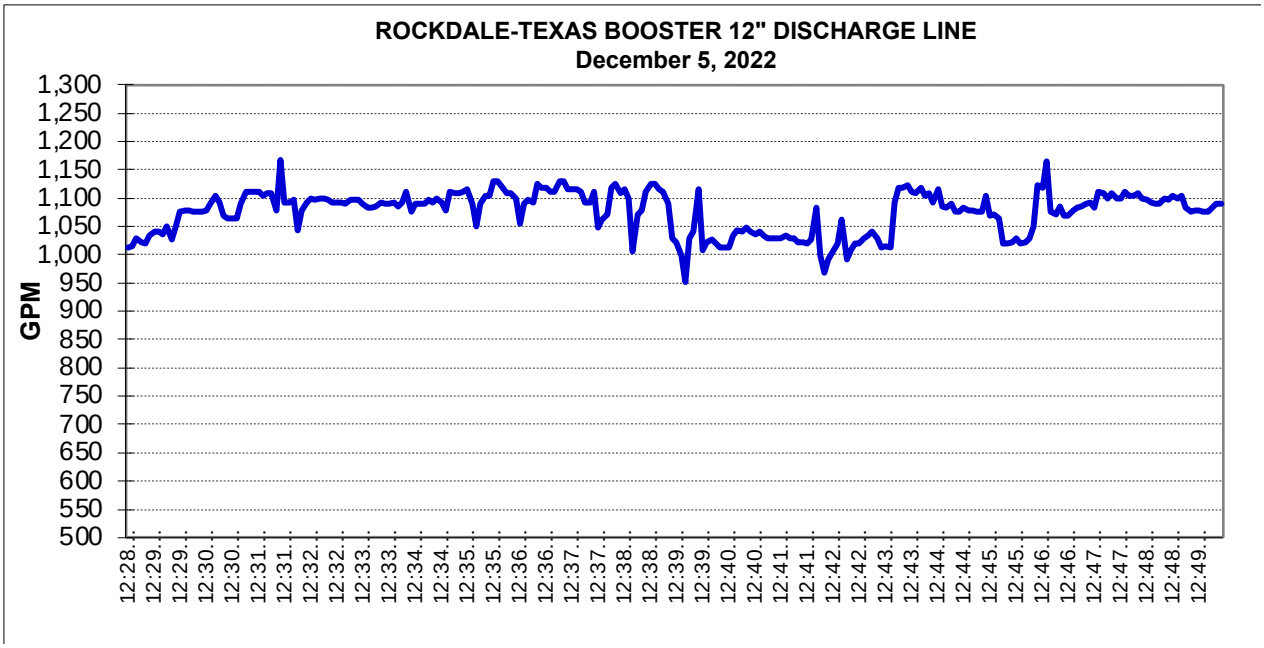
2.3.9 TEXAS BOOSTER OUTFLOW METER

	Gallons Recorded			OBSERVATIONS
	Well Meter	Test Meter	% Var.	New Siemens Mag meter in 2017(?).
Test #1	15,000	14,665	102.2%	Test meter upstream of installed meter, adequate spacing, light turbulence. Slight over registration, considered accurate for field test. Approx 1,100 gpm.



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2.4 ANALYSIS OF PRODUCTION & SALES TOTALS

The City's monthly water production and sales records were reviewed for the period January 2019 through December 2022. These records are summarized in the table and graphs on the following pages. We have based our assessment on reported monthly well production. The Mill and Texas water plants each have an outflow meter installed. These meters measure actual treated water flows into the distribution system. However, since November 2021, the Mill St outflow meter has been offline. In practice, on a month-to month basis, with reliable and accurate meters in place there should be only be minor differences between total well flow and total plant flow.

The Production and Sales table points out differences in metered ratios when calculated on a monthly basis, versus those calculated on quarterly and annualized basis. Month-to-month fluctuations in metered ratios in water systems are typical and expected. These fluctuations occur in the system, in part because it is physically impractical or impossible to read approximately 2,200 customer meters simultaneously and then compare the total metered distribution with primary water supply meters. The future implementation of AMI meters is expected to allow such comparisons on a weekly or monthly basis.

The un-adjusted annualized metered ratio for the year ending December 2022 is about 70.1%. Since January 2021, the NRW has been reduced by nearly 15 MG/year. This happened as production increased by 9.6 MG while sales increased by more than 24 MG. Total unadjusted annualized NRW through December 2022 was about 80.6 million gallons.

As stated previously, the production meter tests indicated three well meters were over registering. Since we have no idea when this accuracy issue started, we have estimated that nearly 14 MG/year of over registration "may" be occurring, reducing the NRW by that number. The adjusted year end metered ratio could be as high as 74.1%, indicating a 26% NRW.

The last three months of year indicates a dramatic increase in NRW. We believe increased leakage and production meter errors have led to this increase.

The following table and charts review overall production (unadjusted) and sales records, including monthly and annual totals.

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PRODUCTION AND SALES HISTORY 2019-2022

(No Meter Accuracy Adjustments)

Mo./Yr	Total Pumped MG	Wtr Sales MG	NRW MG	NRW %	Qtr Pumped MG	Qtr Sales MG	YTD Prod. MG	YTD Sales MG	YTD NRW MG	YTD NRW %	YTD MR %
Dec-19	18.288	10.987	7.3	39.9%	59.6	41.0	270.8	181.7	89.1	32.9%	67.1%
Jan-20	16.258	11.947	4.3	26.5%	52.5	36.5	265.8	181.4	84.4	31.8%	68.2%
Feb-20	16.338	9.660	6.7	40.9%	50.9	32.6	264.9	180.0	84.9	32.1%	67.9%
Mar-20	17.550	12.065	5.5	31.3%	50.1	33.7	262.6	178.9	83.7	31.9%	68.1%
Apr-20	18.640	12.412	6.2	33.4%	52.5	34.1	262.5	178.0	84.4	32.2%	67.8%
May-20	21.482	14.071	7.4	34.5%	57.7	38.5	262.4	179.4	83.0	31.6%	68.4%
Jun-20	26.884	19.778	7.1	26.4%	67.0	46.3	266.8	184.0	82.8	31.0%	69.0%
Jul-20	29.469	10.212	19.3	65.3%	77.8	44.1	271.2	176.5	94.7	34.9%	65.1%
Aug-20	28.528	21.831	6.7	23.5%	84.9	51.8	264.6	175.9	88.6	33.5%	66.5%
Sep-20	20.592	13.983	6.6	32.1%	78.6	46.0	255.4	167.0	88.4	34.6%	65.4%
Oct-20	21.557	15.031	6.5	30.3%	70.7	50.8	253.6	165.6	88.0	34.7%	65.3%
Nov-20	19.776	13.585	6.2	31.3%	61.9	42.6	255.4	165.6	89.8	35.2%	64.8%
Dec-20	18.805	12.265	6.5	34.8%	60.1	40.9	255.9	166.8	89.0	34.8%	65.2%
Jan-21	20.511	9.839	10.7	52.0%	59.1	35.7	260.1	164.7	95.4	36.7%	63.3%
Feb-21	27.051	16.130	10.9	40.4%	66.4	38.2	270.8	171.2	99.6	36.8%	63.2%
Mar-21	21.388	12.510	8.9	41.5%	69.0	38.5	274.7	171.6	103.0	37.5%	62.5%
Apr-21	22.099	12.412	9.7	43.8%	70.5	41.1	278.1	171.6	106.5	38.3%	61.7%
May-21	21.363	11.283	10.1	47.2%	64.9	36.2	278.0	168.9	109.2	39.3%	60.7%
Jun-21	23.542	16.506	7.0	29.9%	67.0	40.2	274.7	165.6	109.1	39.7%	60.3%
Jul-21	23.784	14.455	9.3	39.2%	68.7	42.2	269.0	169.8	99.2	36.9%	63.1%
Aug-21	28.748	18.804	9.9	34.6%	76.1	49.8	269.2	166.8	102.4	38.0%	62.0%
Sep-21	27.870	22.612	5.3	18.9%	80.4	55.9	276.5	175.4	101.1	36.6%	63.4%
Oct-21	19.704	13.515	6.2	31.4%	76.3	54.9	274.6	173.9	100.7	36.7%	63.3%
Nov-21	15.890	13.297	2.6	16.3%	63.5	49.4	270.8	173.6	97.1	35.9%	64.1%
Dec-21	12.280	10.585	1.7	13.8%	47.9	37.4	264.2	171.9	92.3	34.9%	65.1%
Jan-22*	**10.507**	**11.280**	**-0.77**	**-7.3%**	**Original Data**						
Jan-22*	**13.547**	**11.280**	**2.3**	**16.7%**	41.7	35.2	257.3	173.4	83.9	32.6%	67.4%
Feb-22	13.591	12.035	1.6	11.5%	39.4	33.9	243.8	169.3	74.5	30.6%	69.4%
Mar-22	12.425	10.579	1.8	14.9%	39.6	33.9	234.8	167.4	67.5	28.7%	71.3%
Apr-22	19.305	14.336	5.0	25.7%	45.3	36.9	232.0	169.3	62.8	27.0%	73.0%
May-22	24.154	14.876	9.3	38.4%	55.9	39.8	234.8	172.9	62.0	26.4%	73.6%
Jun-22	27.829	22.086	5.7	20.6%	71.3	51.3	239.1	178.5	60.7	25.4%	74.6%
Jul-22	31.284	24.570	6.7	21.5%	83.3	61.5	246.6	188.6	58.1	23.5%	76.5%
Aug-22	27.913	20.485	7.4	26.6%	87.0	67.1	245.8	190.3	55.5	22.6%	77.4%
Sep-22	21.910	16.782	5.1	23.4%	81.1	61.8	239.8	184.4	55.4	23.1%	76.9%
Oct-22	28.486	15.886	12.6	44.2%	78.3	53.2	248.6	186.8	61.8	24.9%	75.1%
Nov-22	23.249	12.968	10.3	44.2%	73.6	45.6	256.0	186.5	69.5	27.2%	72.8%
Dec-22	25.958	13.178	12.8	49.2%	77.7	42.0	269.7	189.1	80.6	29.9%	70.1%

Source: City of Rockdale staff and JBS Water, Inc.

**Original data showed more water sold than produced. We averaged the two months before and after to balance out the production and sales table.*

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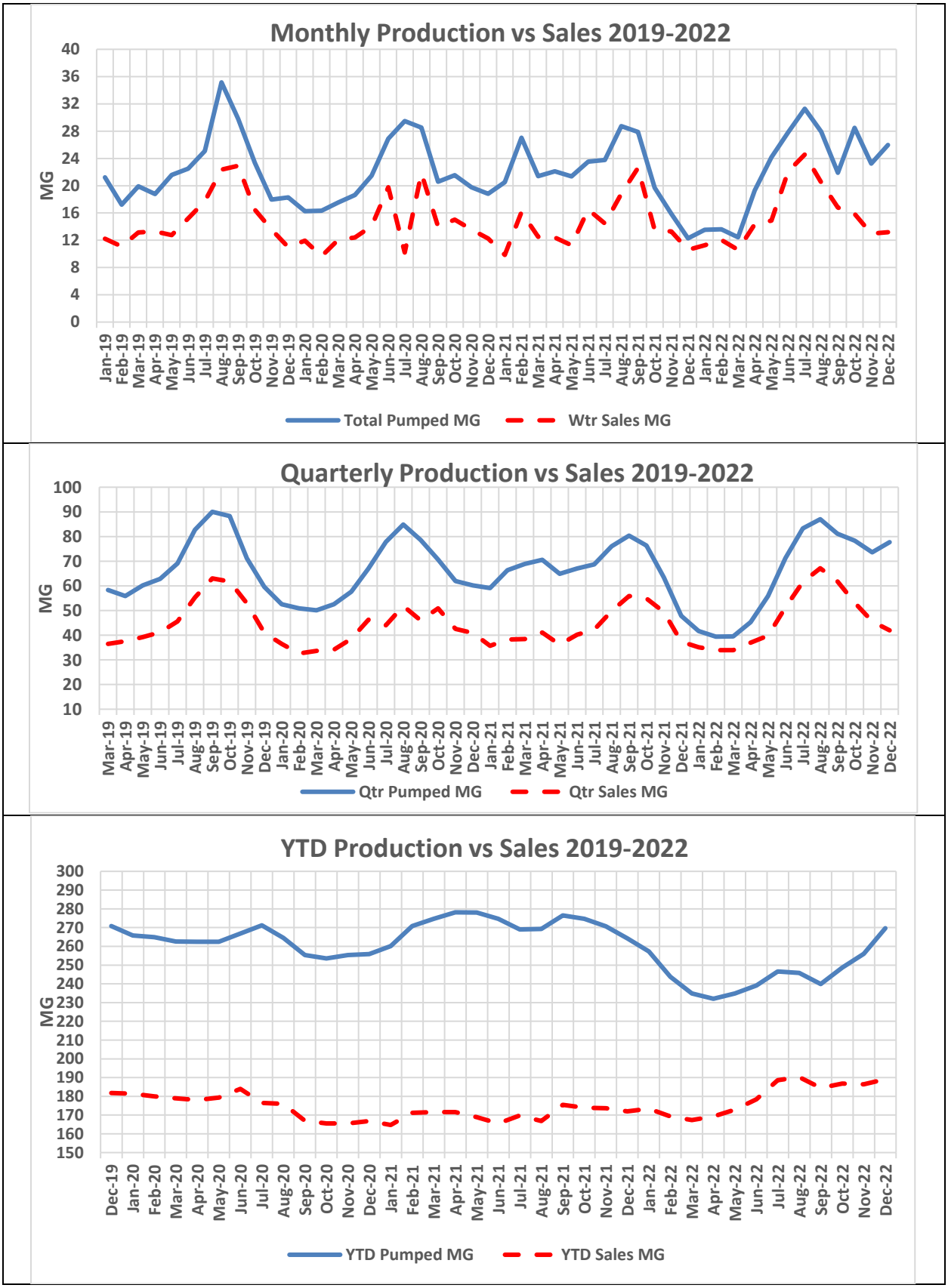

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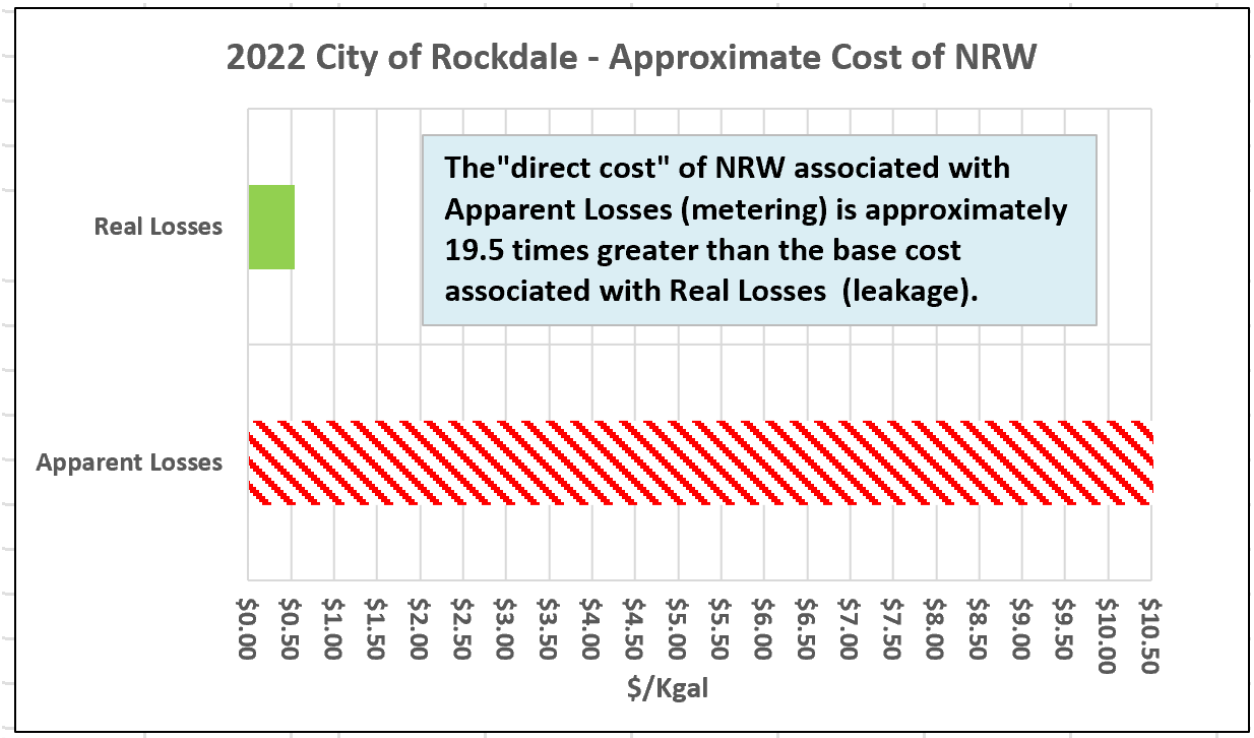
2.5 COST OF NON-REVENUE WATER

The ultimate goal of this study has been to analyze the impact and cost of apparent losses and real losses and their relationship to the total NRW in the system. The monthly difference between production and sales, as well as the cost impact, is documented.

Understanding the component costs of NRW makes it straightforward for the City to implement and maintain on-going corrective action.

The following table compares the estimated value of NRW associated with apparent and real losses. Through November 2022, the base production cost (raw water delivery, energy and chemicals) was approximately $0.54 per 1,000 gallons of water produced. Since water loss associated with leakage (Real Losses) is not water sold, this base value is used in the analysis. Based on the City's rate table, the weighted value for all accounts equates to approximately $10.54/1000 gallons.

The chart below shows that water loss associated with metering will cost the City about 19.5 times more than an equal volume associated with pipe leakage. Direct costs do not take into consideration labor, water conservation issues, water plant expansion costs, lawsuits, etc.



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FINAL REPORT
COMPREHENSIVE WATER DISTRIBUTION & METER MANAGEMENT AUDIT

City of Rockdale, Texas

January 2022

CHAPTER 3

METERED CONSUMPTION REVIEW

Chapter 3

CITY OF ROCKDALE, TEXAS
WATER AUDIT & METER MANAGEMENT AUDIT

3. METERED CONSUMPTION REVIEW

3.1 WATER CONSUMPTION AND BILLING

The Customer Service Department transferred to JBS a detailed meter consumption database that included 36 months of data ending in October 2022 on nearly 2,200 active accounts. The City staff spent a great deal of time verifying meter data in order to update the working database for our purposes.

This metered consumption analysis has included the following topics:

• Distribution of Sales by Meter Size	• Meter Route Analysis
• Distribution of Sales by Account Classification	• Meter Age Analysis
• Residential and Multi-Family Accounts	• Meter Payback Cost Analysis
• Commercial Accounts	

Account usage was calculated for the last 12-month average, summer-average (June, July, August, September) and winter-average consumption (December, January, February).

Total water sales were reviewed by meter size and customer class. Customer class codes were reviewed by multi-family or apartments, city, commercial, irrigation, irrigation schools, residential and trailer parks including RV accounts. Regardless of class code, all irrigation accounts were reviewed separately.

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3.2 DISTRIBUTION OF USE

3.2.1 Usage By Meter Size and Group Classification

The following tables and graphs compare the distribution of water usage by meter size and class code for the 2,179 active accounts. Over 78% of all meters are 5/8x3/4-inch in size and they record nearly 58% of the water sold. The 2-inch and larger meters comprise 3.5% of all accounts and consume approximately 20% of all water sold.

Usage by meter size was compared for the year 2022 versus 2021. Meter size groupings showed more water was consumed in 2022 than 2021 for all meter sizes, except the 4-inch meters.

Also of concern is the high number of low use accounts (≤ 2,000 Gallons/Mo.). System wide, 23% of the customers averaged 2 Kgal/mo. or less for the 12 months ending October 2022. The small meter accounts totaled over 24% of all low use accounts.

DISTRIBUTION OF USAGE BY METER SIZE

Mtr Size	No. Accts	No. Low Use Accts	% Low Use Accts	2022 Kgal	2021 Kgal	2022 Kgal/M	2022 Kgal/M less 0's	2021 Kgal/M	2021 Kgal/M less 0's	% Accts	% Usage
5/8	1,713	416	24.3%	105,213	94,686	5.12	5.39	4.61	4.86	78.6%	57.6%
1	371	71	19.1%	37,187	33,025	8.35	8.76	7.42	8.00	17.0%	20.3%
1.5	18	4	22.2%	3,005	2,758	13.91	20.76	12.77	15.39	0.8%	1.6%
2	55	7	12.7%	24,641	24,615	37.33	38.10	37.30	39.28	2.5%	13.5%
3	9	1	11.1%	7,503	7,121	69.47	75.24	65.94	73.27	0.4%	4.1%
4	6	3	50.0%	2,267	2,483	31.48	31.48	34.49	36.04	0.3%	1.2%
NA	7	0	0.0%	2,970	2,781	35.35	35.61	33.11	35.06	0.3%	1.6%
Total	**2,179**	**502**	**23.0%**	**182,785**	**167,469**	**6.99**	**7.38**	**6.40**	**6.81**	100.0%	100.0%

The following table shows usage by the customer class code.

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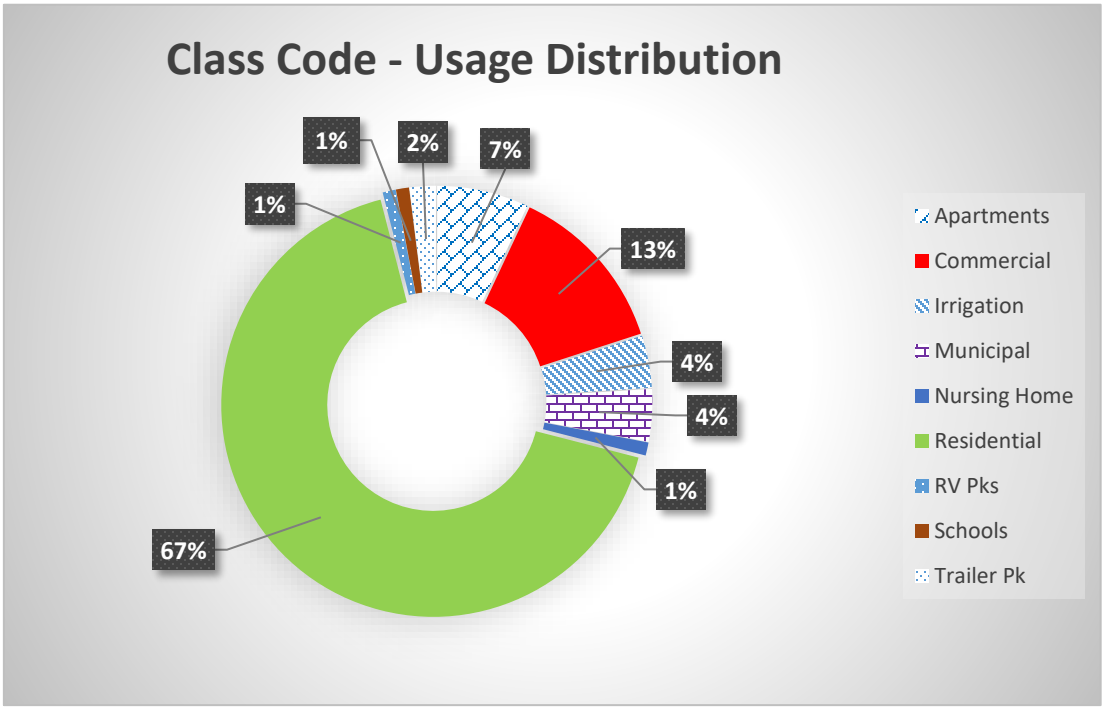
DISTRIBUTION OF USAGE – CLASS CODE

Class Code	No. Accts	No. Low Use Accts	% Low Use Accts	2022 Kgal	2021 Kgal	2022 Kgal/M	2022 Kgal/M less 0's	2021 Kgal/M	2021 Kgal/M less 0's	% Accts	% Usage
Apart.	19	2	10.5%	13,187	11,611	57.84	58.58	50.92	50.99	0.9%	7.2%
Church	31	22	71.0%	787	936	2.11	2.24	2.52	2.85	1.4%	0.4%
Com	210	113	53.8%	23,497	23,182	9.32	9.45	9.20	10.02	9.6%	12.8%
EMP	3	1	33.3%	142	112	3.92	3.92	3.12	3.12	0.1%	0.1%
Hospital	3	1	33.3%	223	67	6.20	6.20	1.86	2.17	0.1%	0.1%
Irrigation	32	12	37.5%	6,510	5,689	16.94	24.63	14.81	21.83	1.5%	3.6%
Municipal	26	8	30.8%	6,681	5,162	21.41	28.75	16.55	20.55	1.2%	3.7%
Nursing	1	0	0.0%	1,976	1,956	164.70	164.70	162.98	162.98	0.0%	1.1%
Res.	1,835	338	18.4%	122,575	110,540	5.56	5.74	5.02	5.20	84.2%	67.0%
RV Parks	5	1	20.0%	2,389	2,527	39.82	39.82	42.13	44.19	0.2%	1.3%
Schools	12	4	33.3%	2,155	2,689	14.96	18.74	18.67	21.00	0.6%	1.2%
Trailer Pk	2	0	0.0%	2,754	3,103	114.77	114.77	129.28	129.28	0.1%	1.5%
Totals	**2,179**	**502**	**23.0%**	**182,876**	**167,574**	**6.99**	**7.38**	**6.41**	**6.81**	**100.0%**	**100.0%**



The following table summarize the monthly usage by class code.

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MONTHLY USAGE BY CLASS CODE

(1000 Gallons)

Mo/Yr	Apt	Church	City	Com	EMP	Hosp	Irrig.	Nursing Hm	Trailer Pk	Res.	RV	Sch
Jan-20	1,128.1	41.9	500.4	2,206.4	9.0	4.1	126.2	0.0	227.0	6,572.7	162.3	255.0
Feb-20	1,003.5	27.1	259.8	1,481.8	9.4	3.3	142.5	0.0	215.8	5,700.6	154.9	233.2
Mar-20	1,229.4	20.4	245.5	1,785.3	9.1	4.3	105.4	0.0	267.9	7,560.9	164.4	174.8
Apr-20	1,081.3	13.8	248.4	1,379.3	10.7	3.4	380.2	0.0	229.4	7,920.8	261.2	28.2
May-20	967.6	51.5	325.0	1,567.1	11.8	5.6	706.8	0.0	248.9	9,372.0	195.3	33.0
Jun-20	1,187.6	57.9	420.1	2,078.2	11.3	2.1	1,121.9	0.0	272.2	13,851.6	166.1	59.7
Jul-20	1,098.7	53.4	438.9	1,749.5	14.8	5.4	1,115.3	0.0	279.9	16,519.0	177.6	58.5
Aug-20	1,310.2	69.3	344.4	1,813.2	16.0	2.5	1,227.9	94.7	304.6	15,426.6	193.4	276.9
Sep-20	1,113.3	77.2	332.5	1,586.8	9.0	7.9	563.4	8.3	626.4	8,637.7	196.7	300.2
Oct-20	834.2	174.3	373.3	1,804.4	10.4	2.4	570.2	70.1	262.9	10,113.8	161.6	308.6
Nov-20	828.0	73.1	296.8	1,838.8	7.4	2.3	407.8	270.5	257.4	8,864.8	199.6	240.7
Dec-20	918.0	132.2	199.3	1,600.2	9.4	2.5	229.3	168.3	286.9	7,952.3	210.3	202.8
Jan-21	711.4	35.4	222.0	1,455.7	8.5	2.9	130.2	213.7	204.3	5,865.9	150.1	167.3
Feb-21	890.7	153.5	575.3	2,828.4	8.8	3.9	119.3	112.9	341.6	9,341.6	330.4	363.6
Mar-21	929.5	70.4	484.6	1,965.0	5.2	18.8	219.3	111.6	244.3	7,560.7	261.2	286.1
Apr-21	935.5	49.8	550.9	1,776.3	6.6	15.2	392.2	121.8	255.6	8,245.5	189.9	228.7
May-21	860.7	37.7	431.6	1,750.1	6.4	4.5	230.5	138.1	223.1	6,916.7	163.4	216.5
Jun-21	1,005.0	67.0	425.0	2,276.1	9.6	3.2	421.5	149.1	273.0	11,073.9	256.5	64.0
Jul-21	876.9	56.9	418.8	1,914.8	15.2	2.6	463.5	132.2	216.9	9,596.5	198.9	55.0
Aug-21	1,298.5	65.0	541.8	1,863.6	12.4	3.7	951.4	146.4	258.9	12,759.3	196.4	388.5
Sep-21	1,264.9	123.0	534.5	2,029.4	13.4	3.9	1,218.5	146.5	294.0	14,431.5	232.2	271.9
Oct-21	1,091.1	72.4	483.2	1,872.9	9.5	3.6	903.9	244.6	246.6	7,837.9	138.7	203.0
Nov-21	1,101.7	51.3	496.2	2,058.0	11.7	3.7	431.1	181.6	293.6	7,744.6	167.1	198.4
Dec-21	902.2	46.5	303.8	1,625.4	11.2	4.1	155.7	166.9	168.8	6,334.0	164.8	135.9
Jan-22	939.4	40.5	360.9	1,876.2	10.3	5.6	91.7	159.1	206.3	6,979.9	209.2	141.4
Feb-22	973.1	57.7	443.2	1,834.7	9.8	14.1	61.9	157.0	269.4	7,393.9	270.5	258.4
Mar-22	984.0	27.9	429.9	1,723.3	9.1	5.4	58.9	129.4	197.7	6,530.7	165.7	157.1
Apr-22	1,067.0	56.2	525.9	2,175.7	9.2	5.8	224.3	157.9	203.8	9,376.5	165.6	184.2
May-22	967.3	90.6	482.4	1,807.9	10.6	141.7	465.1	159.6	186.2	10,077.9	185.2	165.0
Jun-22	1,395.1	96.2	701.2	2,141.8	13.6	4.9	1,003.0	189.5	255.3	15,454.8	224.3	79.3
Jul-22	1,338.8	103.6	763.7	2,047.8	15.8	7.8	1,395.3	148.1	252.0	18,048.8	202.3	74.3
Aug-22	1,461.9	113.5	945.3	1,973.0	15.2	18.7	1,061.1	168.7	282.4	13,862.5	231.6	206.1
Sep-22	1,033.7	41.8	586.8	2,205.3	11.9	5.8	640.0	179.2	207.6	10,516.5	198.5	275.0
Oct-22	1,022.5	57.9	641.1	2,015.5	12.8	5.7	918.5	179.4	231.3	10,184.3	204.3	279.1

The following table and charts summarize annualized usage (running 12-month total) by class code. Several classes have been combined such as commercial, churches, EMP, hospital and the nursing home. The same for trailer parks and RV parks.

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It should be noted that annualized metered usage increased by 21 MG since August 2021 for all categories except meters serving trailer parks-RV parks; schools dropped in usage by about 1.6 million gallons combined.

ANNUALIZED USAGE BY CLASS CODE

Thousand Gallons

Mo/Yr	City	Com-Ch-EMP-Hosp-NH	Irrig.	Apt	Trailer +RV	Sch	Res	Total Kgal
Dec-20	3,984	22,469	6,697	12,700	5,723	2,172	118,493	172,238
Jan-21	3,706	21,924	6,701	12,283	5,688	2,084	117,786	170,172
Feb-21	4,022	23,510	6,678	12,170	5,989	2,214	121,427	176,010
Mar-21	4,261	23,862	6,792	11,871	6,062	2,326	121,427	176,601
Apr-21	4,563	24,424	6,804	11,725	6,017	2,526	121,752	177,811
May-21	4,670	24,725	6,327	11,618	5,960	2,710	119,296	175,306
Jun-21	4,675	25,081	5,627	11,435	6,051	2,714	116,519	172,102
Jul-21	4,655	25,379	4,975	11,213	6,009	2,710	109,596	164,537
Aug-21	4,852	25,475	4,699	11,202	5,966	2,822	106,929	161,945
Sep-21	5,054	26,102	5,354	11,353	5,669	2,794	112,723	169,049
Oct-21	5,164	26,243	5,687	11,610	5,630	2,688	110,447	167,469
Nov-21	5,363	26,357	5,711	11,884	5,634	2,646	109,326	166,921
Dec-21	5,468	26,299	5,637	11,868	5,470	2,579	107,708	165,029
Jan-22	5,607	26,674	5,599	12,096	5,531	2,553	108,822	166,882
Feb-22	5,475	25,640	5,541	12,179	5,399	2,448	106,874	163,556
Mar-22	5,420	25,364	5,381	12,233	5,257	2,319	105,844	161,818
Apr-22	5,395	25,799	5,213	12,365	5,181	2,274	106,975	163,202
May-22	5,446	26,073	5,448	12,471	5,166	2,223	110,137	166,964
Jun-22	5,722	26,014	6,029	12,861	5,116	2,238	114,518	172,498
Jul-22	6,067	26,215	6,961	13,323	5,155	2,257	122,970	182,948
Aug-22	6,470	26,413	7,071	13,487	5,213	2,075	124,073	184,802
Sep-22	6,523	26,541	6,492	13,255	5,093	2,078	120,158	180,140
Oct-22	6,680	26,609	6,507	13,187	5,144	2,154	122,504	182,785

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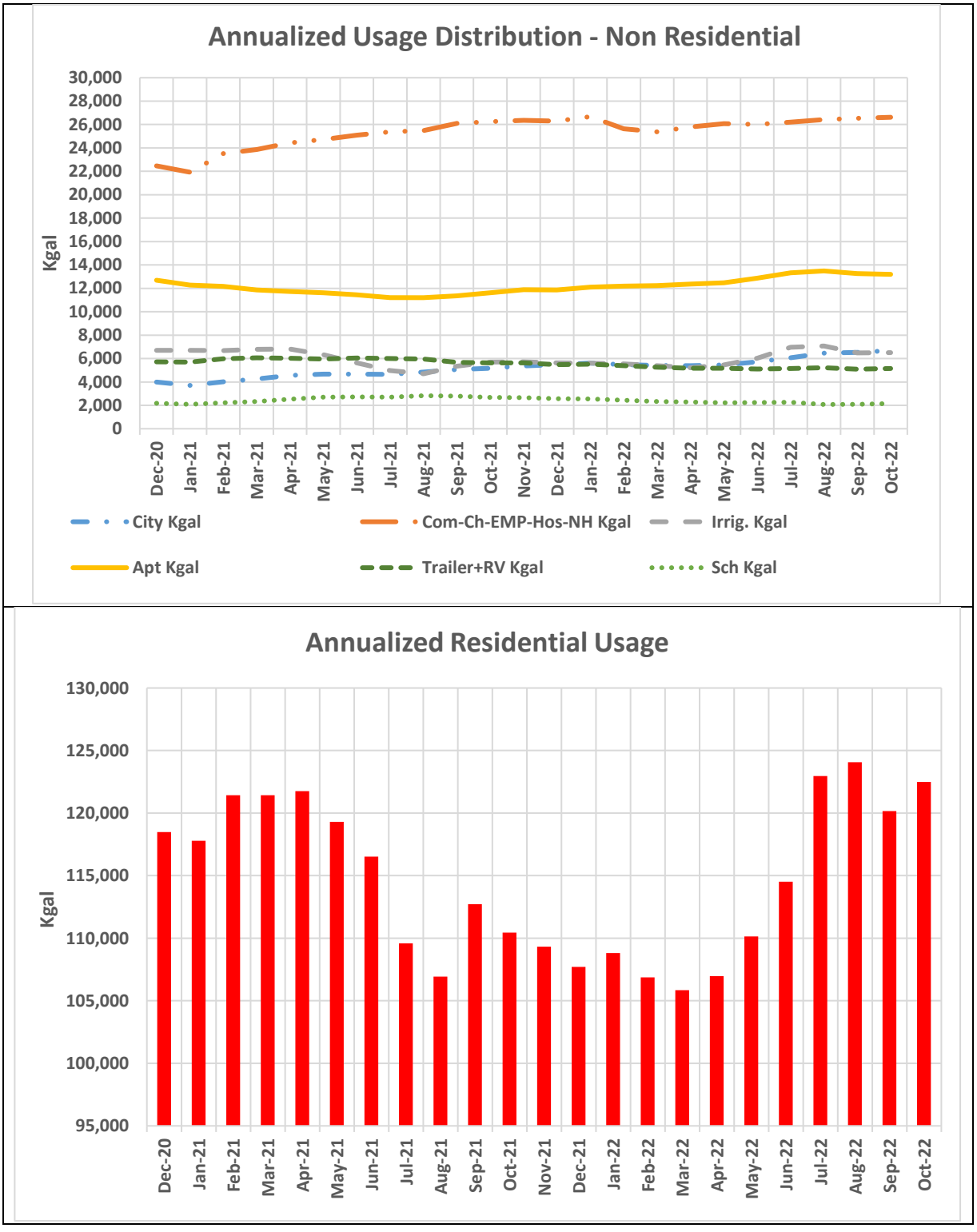

3.2.2 Distribution of Usage – Meter Route (Book No.)

In some water systems a review of water usage by meter route will access usage by demographics. As a rule, higher income residential customers use more water than a low-income family. The following two tables compare usage for each of the meter routes. The

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following table compares total usage for the three years reviewed as well as the number of low use and residential accounts in each route.

The twelve months ending October 2022 indicate that metered usage increased system wide by about 15 MG when compared to the previous year. All Routes showed an increase in usage. What is interesting is the high percentage of low use accounts in Route 1 compared to Route 5. Route 5 has approximately double the number of accounts in each of the other routes.

USAGE DISTRIBUTION BY METER ROUTE

Rte No.	No. Accts	% Accts	No. Res Accts	% Res.	No. Low Use Acct	% Low Use Accts	Total Units	2022 Total Kgal	2021 Total Kgal	2020 Total Kgal	2022 Kgal/M /Acct
01	291	13.4%	223	76.6%	97	33.3%	376	18,332	17,787	19,860	5.25
02	309	14.2%	256	82.8%	83	26.9%	391	25,068	23,928	22,718	6.76
03	377	17.3%	341	90.5%	90	23.9%	377	21,783	20,518	20,382	4.81
04	498	22.9%	337	67.7%	142	28.5%	631	51,278	49,574	46,585	8.58
05	704	32.3%	677	96.2%	90	12.8%	722	66,324	55,663	59,684	7.85
Total	**2,179**	**100%**	**1,834**	**84.2%**	**502**	**23.0%**	**2,497**	**182,785**	**167,469**	**169,229**	**6.99**

The following table compares residential accounts by route number. In Route 5, the average usage per account is approximately 3 Kgal/month more than the other routes; low use accounts are about 50% less than the other routes.

RESIDENTIAL USAGE BY METER ROUTE

Rte No.	No. Accts	% Accts	No. Low Use Accts	% Low Use Accts	2022 Kgal	2021 Kgal	2020 Kgal	2022 Kgal/M /Acct	% Accts	% Usage
01	223	12.2%	51	22.7%	11,620	11,320	11,587	4.30	12.2%	9.4%
02	256	14.0%	58	22.7%	12,702	13,161	12,364	4.13	13.9%	10.3%
03	341	18.6%	72	21.1%	19,187	17,883	17,869	4.69	18.5%	15.5%
04	337	18.4%	77	22.8%	16,743	15,670	17,250	4.13	18.3%	13.5%
05	677	36.9%	85	12.4%	63,594	53,313	57,129	7.71	37.2%	51.3%
Total	**1,834**	100%	**343**	**18.6%**	**123,846**	**111,347**	**116,199**	**5.59**	100.0%	100.0%

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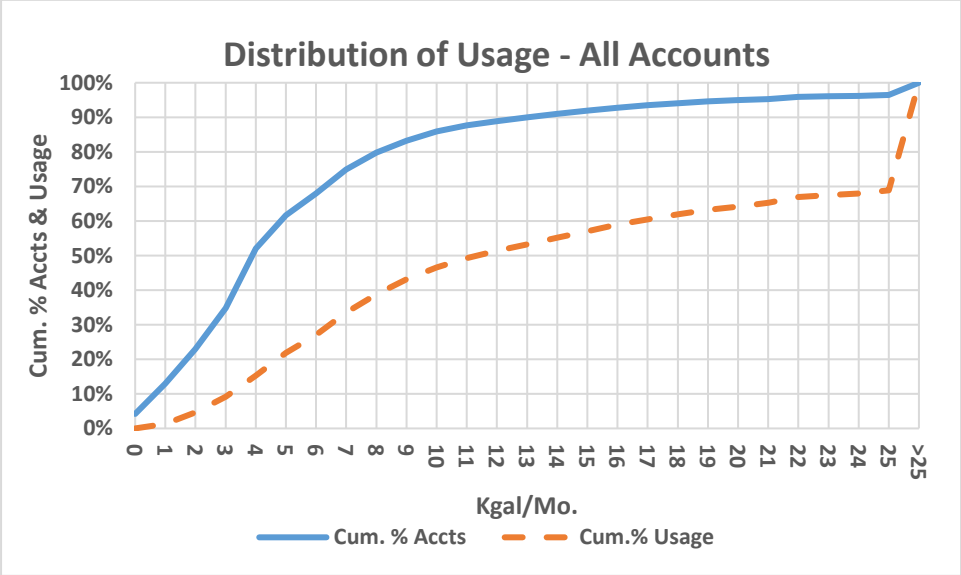
3.2.3 Distribution of Usage-All Accounts

The following table and graph show the distribution of usage for all accounts in the water system. The table indicates that over 23% of all customers are considered low use averaging 2,000 gallons per month or less. Approximately 62% of customers use 5,000 gallons per month of water or less. However, they account for only 22% of total usage. Approximately 86% of the customers use 10,000 gallons or less per month representing 48% of all water sold. Approximately 3.5% of all customers account for 31% of all sales (by volume). The top 50 consumers are listed below the following table and chart.

DISTRIBUTION OF USAGE – ALL ACCOUNTS

Kgal/M	Cum. % Accts	Cum.% Usage	Kgal/M	Cum. % Accts	Cum.% Usage
0	7.7%	0.0%	13	90.0%	53.2%
1	17.2%	1.3%	14	91.0%	55.2%
2	23.5%	4.6%	15	91.9%	57.0%
3	34.8%	9.2%	16	92.8%	59.0%
4	52.0%	15.3%	17	93.5%	60.5%
5	61.7%	21.9%	18	94.1%	61.9%
6	68.0%	27.0%	19	94.6%	63.2%
7	74.9%	33.5%	20	95.0%	64.2%
8	79.8%	38.8%	21	95.3%	65.3%
9	83.2%	43.1%	22	95.9%	66.9%
10	85.9%	46.6%	23	96.1%	67.5%
11	87.7%	49.3%	24	96.2%	68.0%
12	88.9%	51.4%	25	96.5%	68.9%
13	90.0%	53.2%	>25	100.0%	100.0%



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TOP 50 CONSUMERS

Rte No.	Name	Class Code	No. Units	Mtr Size	2022 Kgal/M
01	HOUSING AUTHORITY	Apts	60	3	352.55
04	T-N-T CARWASH	COM	1	2	298.96
04	CITY OF ROCKDALE	MUN	1	2	221.42
02	LOS ROBLES MHP, LLC	MH	1	4	168.28
04	ROCKDALE ESTATES & REHAB	NUR	1	2	164.70
02	HUNTERS CHASE SENIOR APTS	Apts	80	3	156.09
04	CGCB PROPERTIES, LLC	Apts	1	1	120.63
04	ROCKDALE INN MOTEL	COM	1	2	109.69
04	CITY OF ROCKDALE	MUN	1	1	109.34
02	DAYS INN	COM	1	2	105.46
04	FALLS CAPITAL INC.	COM	1	1	101.80
04	SHADY GROVE RV PARK	RV	1	2	96.94
01	ROCKDALE APARTMENTS	Apts	27	2	82.03
04	GILL'S BUDGET INN	COM	1	2	75.69
02	SUMUEL PARK	MUN	1	5/8	72.77
02	OM NILKHANTH NAMAH, LLC	COM	1	1	66.78
04	WAL-MART STORES TEXAS, LP	COM	1	2	65.64
04	DAVID VELA	MH	1	2	61.26
02	RAINBOW COURTS MOTEL	Irrig	1	1	57.88
04	MEADOW DR APARTMENTS	Apts	12	2	57.15
04	QUALITY INN HPY LLC	COM	1	5/8	51.94
05	FIRST STEP TO FREEDOM LLC	Apts	10	2	50.87
04	ROCKDALE FED CREDIT UNION	Irrig	1	1	50.00
04	SHADY OAK RV HPY LLC	RV	1	2	49.19
03	ROCKDALE IND SCHOOL	SCH	1	3	48.98
04	O'REILLY AUTO ENTERPRISES	Irrig	1	1	46.56
04	SONIC DRIVE IN # 18	COM	1	5/8	46.52
03	ROCKDALE IND SCHOOL	SCH	1	2	46.13
04	MCCAWLEY OAKS	Apts	15	2	45.97
04	CITIZENS NATIONAL BANK	Irrig	1	1.5	44.74
02	HUNTERS CHASE SENIOR APTS	Irrig	1	1.5	43.88
02	GNS PARMJIT DHALIWAL	COM	1	2	43.60
02	REGENCY INN	COM	1	2	42.17
04	ZIMMERMAN, MONA	Apts	10	1.5	42.14
05	NATALIE HILL	RES	1	5/8	41.63
04	MCDONALDS	Irrig	1	1	40.88
05	MIKE PRUETT	RES	1	1	40.64
04	JULIO'S RESTAURANT	COM	1	5/8	40.19
04	MCCAWLEY OAKS	Apts	15	2	40.07
02	KD45 ROCKDALE RV PK	RV	1	1	40.08
05	AUSTIN TEXAS FM GROUP	Irrig	1	1	38.23

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Rte No.	Name	Class Code	No. Units	Mtr Size	2022 Kgal/M
02	PARSLEY'S FOOD SERV.(LEE'S)	COM	1	5/8	37.38
04	WAL-MART STORES TEXAS, LP	Irrig	1	2	37.34
04	CENTRAL COUNTIES SERVICES	COM	1	1	35.77
05	EMERALD REAL ESTATE LLC	Apts	10	2	34.00
04	MCDONALDS	COM	1	2	33.55
04	TAQUERIA BANDA'S	COM	1	1	33.42
05	CHRISTOPHER GERREN	RES	1	1	32.47
04	CEFCO FOOD STORES	COM	1	1	32.44
04	MCCAWLEY OAKS	Apts	15	2	32.19
05	DIANA M PERRY	RES	1	5/8	31.68

3.2.4 Summer Versus Winter Usage

System wide, summer usage increases by approximately 89% when compared to winter usage. This is as expected. Multi-family or apartments accounts use approximately 46% more water in the summer. Residential accounts consume 109% more water in the summer than in the winter months. The following table summarizes the seasonal fluctuation. As expected, irrigation designated accounts consume nearly 10 times more water in the summer months versus winter.

SUMMER AND WINTER USAGE COMPARISON – CLASS CODE

Class Code	No. Accts	2022 Kgal/M	Sum Kgal/M	Wnt Kgal/M	% Incr. Sum vs Wnt
Apts	19	58.58	71.92	49.38	45.6%
Churches	31	2.24	2.87	1.58	81.6%
City	26	164.70	32.16	15.33	109.8%
Com	211	9.45	9.98	8.48	17.7%
EMP	3	3.92	4.71	3.48	35.3%
Hosp	3	6.20	3.10	2.64	17.4%
Irrig	32	24.63	32.64	3.28	895.1%
Nurse Hm	1	164.70	171.38	161.00	6.4%
Res	1,834	5.74	7.96	3.80	109.5%
RV Park	5	39.82	42.84	42.97	-0.3%
School	12	18.74	15.63	14.88	5.0%
Trailer Pk	2	114.75	124.66	107.42	16.0%
Totals	**2,179**	**7.38**	**9.58**	**5.07**	**89.0%**

Meter Route 5 more than triples its usage in the summer months over winter months.

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SUMMER AND WINTER USAGE COMPARISON – METER ROUTE

Mtr Route	No. Accts	% Accts	2022 Kgal/M/ Acct	Sumr. Kgal/M /Acct	Wnt. Kgal/M /Acct	% Incr. Sum:Wnt
01	291	13.4%	5.25	7.07	4.24	66.7%
02	309	14.2%	6.76	8.78	5.79	51.6%
03	377	17.3%	4.82	6.29	4.14	51.9%
04	498	22.9%	8.58	10.27	7.24	41.9%
05	704	32.3%	7.85	12.26	4.05	202.7%
Total	**2,179**	**100.0%**	**6.99**	**9.58**	**5.07**	89.0%

The following table lists the top 40 accounts that had the largest increase in usage during the summer months compared to winter. Nineteen of these accounts are located in Meter Route 5. Eight of the accounts are listed as irrigation.

TOP USAGE CHANGE ACCOUNTS FROM WINTER TO SUMMER

Rte No.	Name	Class Code	No. Units	Mtr Size	2022 Kgal/M	Sum Kgal/M	Wnt Kgal/M	Sum:Wnt Diff
02	SUMUEL PARK	MUN	1	3/4	72.77	243.80	0.00	243.80
01	HOUSING AUTHORITY	Apts	60	3	352.55	445.43	310.93	134.50
04	ROCKDALE FED CRED UNION	Irrig	1	1	50.00	124.43	0.00	124.43
02	RAINBOW COURTS MOTEL	Irrig	1	1	57.88	127.83	4.13	123.70
02	HUNTERS CHASE SENIOR APTS,	Irrig	1	1.5	43.88	107.23	0.00	107.23
04	CITIZENS NATIONAL BANK	Irrig	1	1.5	44.74	93.93	0.00	93.93
04	ZIMMERMAN, MONA	Apts	10	1.5	42.14	118.25	32.60	85.65
05	NATALIE HILL	RES	1	3/4	41.63	87.23	5.57	81.66
04	WAL-MART STORES TEXAS, LP	Irrig	1	2	37.34	75.43	1.77	73.66
05	AUSTIN TEXAS FM GROUP	Irrig	1	1	38.23	73.48	0.10	73.38
02	CITY OF ROCKDALE	MUN	1	2	24.83	69.03	0.50	68.53
05	MIKE PRUETT	RES	1	1	40.64	70.20	7.93	62.27
04	ROCKDALE INN MOTEL	COM	1	2	109.69	134.40	74.63	59.77
04	CENTRAL COUNTIES SERVICES	COM	1	1	35.77	61.00	4.90	56.10
05	ROCKDALE IND SCHOOL	SCH	1	3	14.84	55.85	0.00	55.85
05	JOSEPH HANSON II	Irrig	1	3/4	30.25	56.28	0.43	55.85
05	JOHN KING	RES	1	3/4	28.03	57.93	4.80	53.13
05	GAYLEN HROMCIK	RES	1	1	30.18	55.38	2.80	52.58
05	R L BURNS	RES	1	3/4	28.93	56.13	4.57	51.56
05	RALPH SIFUENTES	RES	1	1	24.90	51.10	2.73	48.37
03	CITY OF ROCKDALE (VFD)	MUN	1	3/4	26.13	54.50	6.27	48.23
04	MARIA PEREZ	RES	1	3/4	20.62	52.78	4.87	47.91
04	CITY OF ROCKDALE	MUN	1	2	221.42	246.25	199.20	47.05
05	RAY KUCHERA	RES	1	1	28.79	53.85	7.73	46.12
05	DR JOHN M WEED III	RES	1	3/4	28.93	51.53	7.37	44.16
04	MCCAWLEY OAKS	Apts	15	2	45.97	72.10	28.17	43.93

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Rte No.	Name	Class Code	No. Units	Mtr Size	2022 Kgal/M	Sum Kgal/M	Wnt Kgal/M	Sum:Wnt Diff
01	DALE TALLEY	Irrig	1	1	17.23	43.43	0.00	43.43
01	ROCKDALE APARTMENTS	Apts	27	2	82.03	99.73	56.43	43.30
05	CARROLL GLASER	RES	1	1	22.48	45.93	2.93	43.00
04	SNAP FITNESS	COM	1	3/4	19.23	45.73	2.77	42.96
05	JAMES EARLEY	RES	1	3/4	25.29	47.43	5.13	42.30
01	TRACY A TRIPULAS	RES	1	3/4	3.74	42.50	0.20	42.30
05	W H FATHEREE III	RES	1	1	21.87	46.03	3.97	42.06
02	LOS ROBLES MHP, LLC	MH	1	4	168.28	189.85	148.23	41.62
05	FIRST STEP TO FREEDOM LLC	Apts	10	2	50.87	70.50	29.33	41.17
05	DANIEL GOWERS	RES	1	3/4	22.38	43.98	2.87	41.11
05	THOMAS J. & SANDRA DRAKE	RES	1	1	21.77	45.98	5.13	40.85
05	FRANK BURROUGH	RES	1	3/4	26.65	44.78	4.00	40.78
05	ERIKA WULFF	RES	1	3/4	29.13	49.48	9.30	40.18
05	GERI ALEXANDER	RES	1	1	27.34	43.70	3.67	40.03

3.3 LOW USE ACCOUNTS

3.3.1 Zero Consumption & Low Use Accounts

Low use accounts may be indicators of meter accuracy related issues. All low use accounts were reviewed by meter size, class code, meter age and meter routes. Low use accounts are defined as customers consuming 2,000 gallons of water in a one-month period (<2Kgal/mo.).

The following table summarizes the low use accounts by month revealing that each month low usage accounts make up a large percentage of all active accounts. The percentages are based on 2,179 active accounts. The highest month of low use accounts was January 2021 that totaled over 43% of all accounts while the lowest month was July 2022 at 26%.

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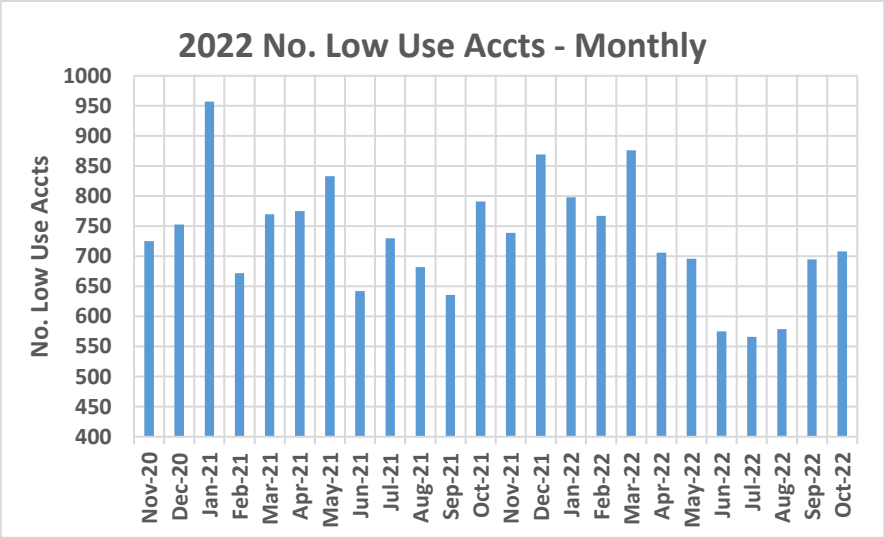
LOW USE ACCOUNTS - MONTHLY

Mo/Yr	No. Low Use Accts	% Low Use Accts	Mo/Yr	No. Low Use Accts	% Low Use Accts
Nov-20	725	33.3%	Nov-21	739	33.9%
Dec-20	753	34.6%	Dec-21	869	39.9%
Jan-21	957	43.9%	Jan-22	798	36.6%
Feb-21	672	30.8%	Feb-22	767	35.2%
Mar-21	770	35.3%	Mar-22	876	40.2%
Apr-21	775	35.6%	Apr-22	706	32.4%
May-21	833	38.2%	May-22	696	31.9%
Jun-21	642	29.5%	Jun-22	575	26.4%
Jul-21	730	33.5%	Jul-22	566	26.0%
Aug-21	682	31.3%	Aug-22	579	26.6%
Sep-21	636	29.2%	Sep-22	695	31.9%
Oct-21	791	36.3%	Oct-22	708	32.5%



For the 12 months ending October 2022, there are over 500 accounts that *"average"* 2,000 gallons per month or less or about 23% of the total. Over 92% of all low use accounts are served by a 5/8x3/4-inch meter, which is expected. The following tables summarize low use accounts by meter size, class code and meter route.

LOW USE ACCOUNTS - METER SIZE

Mtr Size	No. Accts	No. Low Use Accts	% Low Use Accts
5/8	1,720	416	24.2%
1	371	71	19.1%
1.5	18	4	22.2%
2	55	7	12.7%
3	9	1	11.1%
4	6	3	50.0%
Total	**2,179**	**502**	**23.0%**

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LOW USE ACCOUNTS – CLASS CODE

Class Code	No Accts	No. Low Use Accts	% Low Use Accts
Apts	19	2	10.5%
Church	31	21	67.7%
City	26	8	30.8%
Com	210	110	52.4%
EMP	3	1	33.3%
Hosp	3	1	33.3%
Irrig	32	12	37.5%
Nursing	1	0	0.0%
Res	1,835	342	18.6%
RV	5	1	20.0%
Sch	12	4	33.3%
Trailer Pk	2	0	0.0%
Total	**2,179**	**502**	**23.0%**

Meter routes or books were reviewed as a geographic indicator as to where low use accounts existed. Unfortunately, it is difficult to determine a pattern of low use customers in the system as these accounts are dispersed across all demographic sectors, except for route 5.

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LOW USE ACCOUNTS – METER ROUTE

Mtr Route	No. Accts	No. Res. Accts	% Res Accts	No. Low Use Accts	% Low Use Accts	No. Low Use Res. Accts	% Res. Low Use Accts
01	291	225	77.3%	97	33.3%	51	52.6%
02	309	256	82.8%	83	26.9%	58	69.9%
03	377	341	90.5%	90	23.9%	72	80.0%
04	498	338	67.9%	142	28.5%	77	54.2%
05	704	687	97.6%	90	12.8%	84	94.4%
Total	**2,179**	**1,847**	**84.8%**	**502**	**23.0%**	**342**	**68.3%**

It is interesting to note that Meter Route 5 has about half as many low use accounts as the other meter routes.

3.3.2 Low Use Multi-Family Accts

There are two accounts listed as low use that service multiple units. It should be noted that for this audit, all multi-unit residential accounts are listed as apartments in the class code. Meter sizing will be discussed later in this chapter but based on the usage and units served, the meter serving the CGCB Properties, is oversized or inaccurate.

LOW USE MULTI-FAMILY ACCOUNTS

book	Acct No.	Active Occup.	Name	Class	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/ Mo.
04	0609	20	RAYMOND MENDOZA, SR.	Apts	2	5/8	2014	3,980	1.46
04	2628	03	CGCB PROPERTIES, LLC	Apts	32	4	>10	15,650	1.58

3.3.3 Low Use Large Meters (> 3/4-inch)

There are 86 one-inch and larger meters that average 2 Kgal/mo. or less each month. It should be noted that 12 of these accounts are listed as irrigation accounts. The balance of these accounts are either oversized or inaccurate.

LOW USE LARGE METER ACCOUNTS

Book No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
04	2461	00	ROCKDALE IND SCHOOL	Sch	1	4	>10	26612	0.00
04	2628	03	CGCB PROPERTIES, LLC	Apts	32	4	>10	15650	1.58
04	3391	02	QUALITY INN HPY LLC	Com	1	4	>10	10590	0.00
02	2925	00	CITY OF ROCKDALE	City	1	3	NA	0	0.00
05	0115	00	ROCKDALE VETERINARY CLIN	Com	1	2	2014	2099	1.34
03	0131	01	CITY OF ROCKDALE	City	1	2	2014	905	0.93
03	0585	00	ROCKDALE IND SCHOOL	Sch	1	2	2014	900	1.65
02	1067	01	DAYS INN	Irrig	1	2	2021	7918	0.00
01	2100	10	CITY OF ROCKDALE	City	1	2	2018	1650	1.97
04	2761	02	PERRY & PERRY BUILDERS	Com	1	2	2014	10593	0.88
04	2827	00	LOIS FISHER	Res.	1	2	2014	0	0.00
05	0444	00	CITY OF ROCKDALE	City	1	1.5	2015	0	0.00
01	2090	01	TAYLOR AUTO CREDIT	Com	1	1.5	2014	817	0.00

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Book No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
04	2620	00	PEACE LUTHERAN CHURCH	Church	1	1.5	2014	1167	0.30
04	3388	01	CALDWELL COUNTRY FORD	Com	1	1.5	2014	9669	0.91
03	0015	02	BOTTS TITLE COMPANY	Com	1	1	2014	557	0.28
01	0055	03	THE RIOT GROUP LLC	Com	1	1	2018	1044	0.03
05	0200	00	ROBERT EDWARDS	Res.	1	1	2015	1651	1.08
05	0255	00	RAYMOND MATTHEWS	Res.	1	1	2014	3861	1.99
01	0296	00	CITY OF ROCKDALE	City	1	1	2018	1030	0.11
01	0355	00	DOROTHY ZAVODNY	Res.	1	1	2014	2142	1.67
04	0387	02	VIA REAL ESTATE, LLC	Irrig	1	1	2022	0	0.00
05	0470	01	PEGGY PERRY	Res.	1	1	2014	2443	0.03
05	0530	05	TERRY BLACKMON	Res.	1	1	2014	10803	0.15
05	0570	00	RUTH HANEY	Res.	1	1	2021	2215	0.15
02	0607	00	FRANK MONTELONGO	Res.	1	1	2016	289	0.02
05	0740	00	BECKY PAGE	Res.	1	1	2014	3903	1.13
05	0805	02	ANTHONY TIMPE	Res.	1	1	2014	1459	0.44
01	0850	06	NORA JAIMES	Res.	1	1	2014	8474	1.15
01	0855	00	P H PERRY SR	Res.	1	1	2014	1035	0.05
04	0919	00	KAY THEATER	Com	1	1	2014	1257	0.63
01	0960	00	JOHNNIELYN BROWN	Res.	1	1	2014	3658	0.13
05	1005	03	STEPHEN WOTRING	Irrig	1	1	2014	0	0.00
05	1025	03	LINDA MCMAKIN	Res.	1	1	2014	8737	0.02
03	1110	00	ROCKDALE IND SCHOOL	Sch	1	1	2014	1467	1.57
05	1280	00	DONALD E SHUFFIELD	Res.	1	1	2014	2392	0.94
05	1285	03	CRAIG WHITE	Res.	1	1	2014	2978	0.83
01	1330	06	BRENDA JETER	Res.	1	1	2015	1405	0.01
05	1410	04	CHARLIE HALL	Irrig	1	1	2014	0	0.00
05	1430	05	ROBERT S ODELL	Res.	1	1	2014	4941	0.72
05	1455	00	BOBBIE WOBUS	Res.	1	1	2014	4530	1.50
05	1469	01	JULIE CLARK	Res.	1	1	2019	726	1.94
04	1585	00	STEVE'S TEXACO	Com	1	1	2014	1502	1.51
04	1645	01	LAN H DUONG	Com	1	1	2014	3485	1.72
04	1646	01	DOLLAR GENERAL CORP	Com	1	1	2014	1370	1.57
04	1669	01	O'REILLY AUTO ENTERPRIS	Com	1	1	2019	2522	0.64
04	1670	00	OWENS P/J MATULA REALTY	Com	1	1	2019	8843	1.56
05	1670	05	JOE GUTIERREZ	Irrig	1	1	2014	0	0.00
03	1760	01	AMANDA K. WELLS	Res.	1	1	2021	2131	1.72
03	1865	01	BETTY S CAFFEY	Res.	1	1	2014	1269	0.26
01	1880	02	MAGGIE CONTES	Res.	1	1	2014	2565	1.18
03	1895	01	DAVID STADSKLEV	Res.	1	1	2014	675	0.18
02	1918	01	ELISSA BENFORD	Res.	1	1	2020	784	1.01
03	1920	02	KAMIE FITZGERALD	Res.	1	1	2021	5646	0.00
02	1934	00	EZZARD EVERAGE JR	Res.	1	1	2016	493	0.28
05	2020	06	SUSAN M HAU	Res.	1	1	2021	4295	1.08
05	2025	13	CHRISTIAN MORA	Res.	1	1	2021	1091	1.83
01	2070	00	ST JOSEPH CATHOLIC CH	Church	1	1	2014	0	0.00
01	2070	00	ST JOSEPH CATHOLIC CH	Irrig	1	1	2014	1069	1.98
01	2085	00	ST JOSEPH CATHOLIC CH	Church	1	1	2014	292	0.06
04	2115	00	CHAMBER OF COMMERCE	Com	1	1	2014	7129	0.61
02	2240	00	INST. FOR TEACHING GODS	Church	1	1	2014	99	0.13
02	2416	00	INST. FOR TEACHING GODS	Church	1	1	2014	1577	1.58
03	2440	01	BILL MARTIN	Res.	1	1	2014	3481	1.69
04	2520	05	ZACH SPRINGER	Res.	1	1	2014	5339	1.18
04	2602	01	KIMBERLEE M SUMMERS	Res.	1	1	2014	2070	1.28
04	2615	00	PEACE LUTHERAN CHURCH	Church	1	1	2014	1347	0.23
05	2625	01	EA DYER	Res.	1	1	2014	0	0.00
04	2665	01	CITIZENS NATIONAL BANK	Com	1	1	2014	2393	0.53
04	2670	05	BOTTS TITLE	Com	1	1	2014	1558	0.53
02	2690	02	MISTY HORTON	Res.	1	1	2017	3703	0.28
04	2700	00	FIRST UNITED PENTECOSTAL	Church	1	1	2014	2596	0.83
04	2755	02	SMART FINANCIAL OPERAT	Com	1	1	2014	0	0.00
02	2940	03	ROGER BAGGERLY	RV	1	1	2014	7918	0.00
02	2965	07	ALMA WATSON	Res.	1	1	2014	1571	0.93
05	2990	03	HANNAH FOUNTAIN	Res.	1	1	2014	4382	1.98
05	3000	00	REX BARTLETT	Res.	1	1	2021	1830	0.66
05	3050	05	MACY MONTALVO	Res.	1	1	2014	13269	1.78
05	3335	03	MELANIE TODD	Res.	1	1	2014	3337	1.32

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Book No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
04	3380	02	ORBIT TIRES	Com	1	1	2014	1136	0.18
04	3387	01	3G FARM	Com	1	1	2014	2686	0.74
04	3391	02	QUALITY INN HPY LLC	Irrig	1	1	2014	24558	0.00
05	3480	00	ROCKDALE CHRISTIAN CH	Irrig	1	1	2014	0	0.00
05	3480	00	ROCKDALE CHRISTIAN CH	Church	1	1	2014	1054	0.70
05	3650	02	RONALD RABINOWITZ	Irrig	1	1	2014	0	0.00
05	3740	00	JUDITH MATULA	Irrig	1	1	2014	12600	0.03

All Large Meter low use accounts need to be investigated for meter accuracy and meter sizing.

3.3.4 Low Use Accounts– Declining Usage

There are 852 accounts that used less water in 2022 versus 2021 and 282 of those accounts were considered low use customers in 2022. The usage difference for these low use accounts totaled approximately 7.6 MGY. However, one account (Perry Builders) dropped usage by over 1 MG (Feb-2021). We assume that had to do with the arctic freeze that month.

A total of 97 of those low use declining usage accounts had at least a 1.5 Kgal/mo. decline in usage totaling a difference of 545 Kgal/Mo. They are listed below.

DECLINING USE 1.5 KGAL/MO OR GREATER – LOW USE ACCOUNTS

Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
04	2761	02	PERRY & PERRY BUILDERS	COM	1	2	2014	1,059	0.88	87.25	(86.4)
01	1630	04	YOUTH OPPORTUNITY INVES	COM	1	3	2014	9,397	0.18	82.26	(82.1)
04	3391	02	QUALITY INN HPY LLC	Irrig	1	1	2014	2,456	0.00	23.72	(23.7)
04	2461	00	ROCKDALE IND SCHOOL	SCH	1	4	>10	2,661	0.00	16.63	(16.6)
01	0285	01	ROCKDALE HISTOR SOCIETY	COM	1	5/8	2021	177	0.06	14.73	(14.7)
03	0745	98	JUDITH RUBIO HERNANDEZ	RES	1	5/8	2021	0	0.00	10.88	(10.9)
01	1040	01	TANGEE SELF	RES	1	5/8	2020	136	0.40	11.23	(10.8)
02	2940	03	ROGER BAGGERLY	RV	1	1	2014	792	0.00	10.33	(10.3)
05	0530	05	TERRY BLACKMON	RES	1	1	2014	1,080	0.15	9.38	(9.2)
01	1515	26	SUSAN YORK	RES	1	5/8	2021	47	1.43	10.30	(8.9)
01	1696	09	STACY C CLARK	RES	1	5/8	2020	124	1.78	9.91	(8.1)
04	2030	01	ARLISS RICHTER	RES	1	1	2014	601	1.51	8.91	(7.4)
01	0110	01	JYOTSHNA REED	COM	1	5/8	2021	0	0.00	6.40	(6.4)
03	1920	02	KAMIE FITZGERALD	RES	1	1	2021	565	0.00	6.31	(6.3)
04	1355	04	CARLOTA CAMBRON	RES	1	5/8	2021	56	0.35	6.60	(6.3)
02	1730	00	NEW HOPE BAPTIST CH	CH	1	5/8	2020	104	1.24	7.43	(6.2)
03	0395	04	LEONZO M LEPE	RES	1	5/8	2021	88	1.72	7.95	(6.2)
03	1145	13	REBECCA NINK	RES	1	5/8	2021	98	1.16	7.25	(6.1)
05	2970	01	DARLA ROSE	RES	1	5/8	2020	119	2.00	8.07	(6.1)
05	2965	00	DOROTHY LAWSON	RES	1	5/8	2021	86	1.44	7.31	(5.9)
02	1918	01	ELISSA BENFORD	RES	1	1	2020	78	1.01	6.77	(5.8)
01	0850	06	NORA JAIMES	RES	1	1	2014	847	1.15	6.95	(5.8)
01	1105	16	ERIC B VASQUEZ	RES	1	5/8	2021	33	1.96	7.58	(5.6)
04	1995	00	RICHARD GREEN	RES	1	5/8	2021	444	0.00	5.24	(5.2)
01	1915	00	CROCKER RECLAMATION	COM	1	5/8	2021	8	0.45	5.34	(4.9)
02	2235	00	PECAN CHURCH OF CHRIST	CH	1	5/8	2020	79	1.00	5.91	(4.9)
05	2085	02	LINDA DUBUISSON	RES	1	5/8	2014	312	1.61	6.27	(4.7)

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Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
05	0105	09	BREANNA BAILEY	RES	1	5/8	2014	714	1.95	6.58	(4.6)
02	0055	01	ROCKDALE FOOD MART	COM	1	5/8	2020	81	1.43	5.87	(4.4)
02	1830	06	NATHAN ROBERTS	RES	1	5/8	2021	36	0.31	4.14	(3.8)
04	2180	00	DIXIE WHITMORE	RES	1	5/8	2014	284	0.76	4.55	(3.8)
05	3385	00	PERRY & PERRY BUILDERS	COM	1	5/8	2021	65	0.79	4.63	(3.8)
04	2380	09	PATRICIA GUNN	RES	1	5/8	2019	175	1.64	5.39	(3.8)
02	2010	06	JEREMIAH JENNINGS	RES	1	5/8	2021	33	0.63	4.20	(3.6)
05	2265	18	EVELYN COPELAND	RES	1	5/8	2014	358	0.79	4.41	(3.6)
05	1210	01	JOANN DAVENPORT	RES	1	5/8	2014	357	0.00	3.48	(3.5)
03	1460	14	BRENDA MAYBERRY	RES	1	5/8	2021	60	1.92	5.42	(3.5)
01	0960	00	JOHNNIELYN BROWN	RES	1	1	2014	366	0.13	3.53	(3.4)
01	1445	98	SHADY GROVE RENT PROP	RES	1	5/8	2016	241	1.68	5.00	(3.3)
04	2745	04	GONZALES MEX BAR & GRIL	COM	1	5/8	2020	9	0.01	3.09	(3.1)
04	2520	05	ZACH SPRINGER	RES	1	1	2014	534	1.18	4.30	(3.1)
02	1394	18	ANTONIO CABRERA	RES	1	5/8	2020	54	0.97	3.96	(3.0)
01	1850	00	DORTHY THALER	RES	1	5/8	2015	140	0.17	3.05	(2.9)
03	2345	08	MELANIE D ROBERTS	RES	1	5/8	2021	38	0.79	3.73	(2.9)
03	1760	01	AMANDA K. WELLS	RES	1	1	2021	213	1.72	4.60	(2.9)
04	2650	03	LADONYIA YOUNG	RES	1	5/8	2016	286	1.79	4.70	(2.9)
05	1060	01	JESSENIA ROEMELIN	RES	1	5/8	2014	308	1.16	3.95	(2.8)
01	0160	00	PATTERSON LIBRARY	MUN	1	5/8	2021	24	0.00	2.68	(2.7)
05	1265	07	BETHANY COHEN	RES	1	5/8	2014	644	0.23	2.93	(2.7)
01	1825	01	MARY L WARE	RES	1	5/8	2021	20	0.72	3.43	(2.7)
05	1820	01	DEBORAH SIMS	RES	1	5/8	2014	289	0.79	3.45	(2.7)
03	0940	19	AMY HART	RES	1	5/8	2021	65	1.40	4.10	(2.7)
02	1600	98	AKSHAYA PATEL	RES	1	5/8	2015	226	1.59	4.18	(2.6)
04	2045	07	LANE PRAZAK	RES	1	5/8	2020	74	1.91	4.54	(2.6)
02	0695	02	ZACHARY BROOKS	RES	1	5/8	2020	44	0.73	3.18	(2.5)
05	1025	03	LINDA MCMAKIN	RES	1	1	2014	874	0.02	2.41	(2.4)
03	0730	04	VICKI GERRALD	RES	1	5/8	2021	22	0.03	2.43	(2.4)
05	2655	07	JOHN TOOMBS	RES	1	5/8	2013	256	0.25	2.63	(2.4)
05	2020	06	SUSAN M HAU	RES	1	1	2021	430	1.08	3.44	(2.4)
03	2035	00	MARY CALK	RES	1	5/8	2021	68	1.97	4.39	(2.4)
02	0675	04	GERMAN ANT VILLATORO	RES	1	5/8	2021	52	1.97	4.32	(2.4)
04	1730	98	STEPHEN JONES	RES	1	5/8	2014	261	0.19	2.49	(2.3)
04	0870	06	MICHAEL BRAGGS	RES	1	5/8	2014	474	1.40	3.73	(2.3)
04	3330	01	TEXAS ELECTRICAL SERVIC	COM	1	5/8	2019	50	0.75	2.90	(2.2)
03	2571	00	DOROTHY PRAZAK	RES	1	5/8	2021	17	0.87	3.02	(2.2)
03	1585	04	DANIEL GORMAN	RES	1	5/8	2014	573	0.74	2.83	(2.1)
03	2525	00	FRANK MONTELONGO	RES	1	5/8	2021	10	0.79	2.90	(2.1)
04	2116	03	ROCKDALE SPEEDY LUBE	COM	1	5/8	2020	51	1.17	3.25	(2.1)
03	2440	01	BILL MARTIN	RES	1	1	2014	348	1.69	3.76	(2.1)
01	0296	00	CITY OF ROCKDALE	MUN	1	1	2018	103	0.11	2.09	(2.0)
03	1300	98	NATE MCMANUS	RES	1	5/8	2021	21	0.53	2.56	(2.0)
03	2835	22	FAITH OLATUNJI	RES	1	5/8	2021	42	1.28	3.27	(2.0)
04	0350	01	DAVID TAYLOR	RES	1	5/8	2014	224	0.23	2.12	(1.9)
01	1080	07	GERALDINE WESTBROOK	RES	1	5/8	2020	46	1.10	2.99	(1.9)
05	2425	00	PAM KEVIL	RES	1	5/8	2014	567	0.00	1.82	(1.8)
05	2395	00	B C GREENSAGE	RES	1	5/8	2020	23	0.13	1.88	(1.8)
04	1100	00	ALYNE YOAKUM	RES	1	5/8	2014	173	0.18	1.98	(1.8)
03	2580	01	MISTY MCCOY	RES	1	5/8	2021	23	0.28	2.11	(1.8)
03	1040	01	ARNULFO LOZANO	RES	1	5/8	2020	31	0.43	2.18	(1.8)
01	1676	01	HARRY MCBRIDE,JR.	RES	1	5/8	2020	37	0.67	2.43	(1.8)
04	0695	01	CROSSROADS BIBLE CH	CH	1	5/8	2014	131	0.85	2.68	(1.8)
05	2400	06	ANTHONY SCOTT	RES	1	5/8	2021	11	1.11	2.91	(1.8)
01	1050	18	STACI BURLIN	RES	1	5/8	2021	32	1.28	3.03	(1.8)
04	0395	04	TAYLOR CONABLE	RES	1	5/8	2021	15	0.17	1.84	(1.7)
02	2690	02	MISTY HORTON	RES	1	1	2017	370	0.28	2.01	(1.7)

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Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal/M	2021 Kgal/M	Change 2022-2021 Kgal/M
01	0445	07	DENISE STARNES	RES	1	5/8	2021	19	0.30	1.98	(1.7)
04	1845	06	CAROLINA ACEITUNO	RES	1	5/8	2020	17	0.01	1.58	(1.6)
05	0570	00	RUTH HANEY	RES	1	1	2021	222	0.15	1.73	(1.6)
01	0661	00	TIM ARLEDGE	RES	1	5/8	2021	2	0.17	1.76	(1.6)
01	1165	00	IGLESIA BAUTISTA	CH	1	5/8	2020	29	0.38	2.02	(1.6)
05	0740	00	BECKY PAGE	RES	1	1	2014	390	1.13	2.73	(1.6)
01	0940	10	JOHN ROREX	RES	1	5/8	2021	46	1.83	3.40	(1.6)
01	2090	01	TAYLOR AUTO CREDIT	COM	1	1.5	2014	82	0.00	1.52	(1.5)
04	2670	05	BOTTS TITLE	COM	1	1	2014	156	0.53	1.98	(1.5)
02	1371	11	MIKALYA WICKENS	RES	1	5/8	2020	36	0.89	2.43	(1.5)
02	0880	25	BRIANT FREEMAN	RES	1	5/8	2021	46	1.64	3.18	(1.5)
03	1485	12	LISA MCKAY	RES	1	5/8	2021	55	1.73	3.18	(1.5)

3.3.5 Low Use Accounts – Meter Age

The following table shows the meter age of low use accounts. Over 60% of the low use accounts had meters installed after 2019 and over 32% were installed prior to 2015. It is conceivable that the newer installations have not been fully occupied.

LOW USE ACCOUNTS – METER AGE

Meter Install Age	No. Accts	% Accts	Cum.% Accts
>10	4	0.8%	0.8%
2013	3	0.6%	1.4%
2014	148	29.5%	30.9%
2015	6	1.2%	32.1%
2016	4	0.8%	32.9%
2017	2	0.4%	33.3%
2018	4	0.8%	34.1%
2019	10	2.0%	36.1%
2020	110	21.9%	58.0%
2021	196	39.0%	97.0%
2022	14	2.8%	99.8%
NA	1	0.2%	100.0%
Totals	**502**	**100.0%**	

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3.4 RESIDENTIAL ACCOUNTS

3.4.1 Residential Meter Usage Distribution

There are 1,834 non-irrigation accounts that are listed as residential and approximately 83% of these are serviced with a 5/8x3/4-inch meter.

Based on usage, it appears that the majority of 1-inch and larger meters are oversized or inaccurate. The following table summarizes usage by meter size.

DISTRIBUTION OF USAGE – SINGLE FAMILY RESIDENTIAL

Mtr Size	No. Accts	2022 Kgal/M	2021 Kgal/M	2020 Kgal/M	% Accts	% Usage
5/8	1,532	5.16	4.66	4.83	83.5%	77.2%
1	293	7.62	6.75	7.27	16.0%	21.9%
1.5	2	10.53	23.24	17.30	0.1%	0.2%
2	7	6.62	5.94	4.47	0.4%	0.5%
Total	**1,834**	**5.57**	**5.02**	**5.23**	**100.0%**	**100.0%**

The following table shows that nearly 25% of residential accounts are considered low use and over 60% of all residential accounts consume 5,000 gallons or less each month and account for 30% of the usage. Approximately 6% of accounts consume more than 15,000 gallons per month and use approximately 21% of the water.

DISTRIBUTION OF USE - RESIDENTIAL ACCOUNTS

Kgal/M	Cum. % Accts	Cum.% Usage	Kgal/M	Cum. % Accts	Cum.% Usage
0	4.7%	0.0%	11	90.1%	69.1%
1	12.7%	1.4%	12	91.4%	71.8%
2	24.7%	5.5%	13	92.5%	74.1%
3	37.9%	12.3%	14	93.4%	76.4%
4	50.1%	20.7%	15	94.3%	78.6%
5	60.9%	30.0%	16	95.2%	81.2%
6	68.1%	37.4%	17	95.9%	83.2%
7	75.6%	46.4%	18	96.6%	85.2%
8	81.4%	54.5%	19	97.1%	87.0%
9	85.3%	60.5%	20	97.5%	91.1%
10	88.4%	65.8%	>20	100.0%	100.0%

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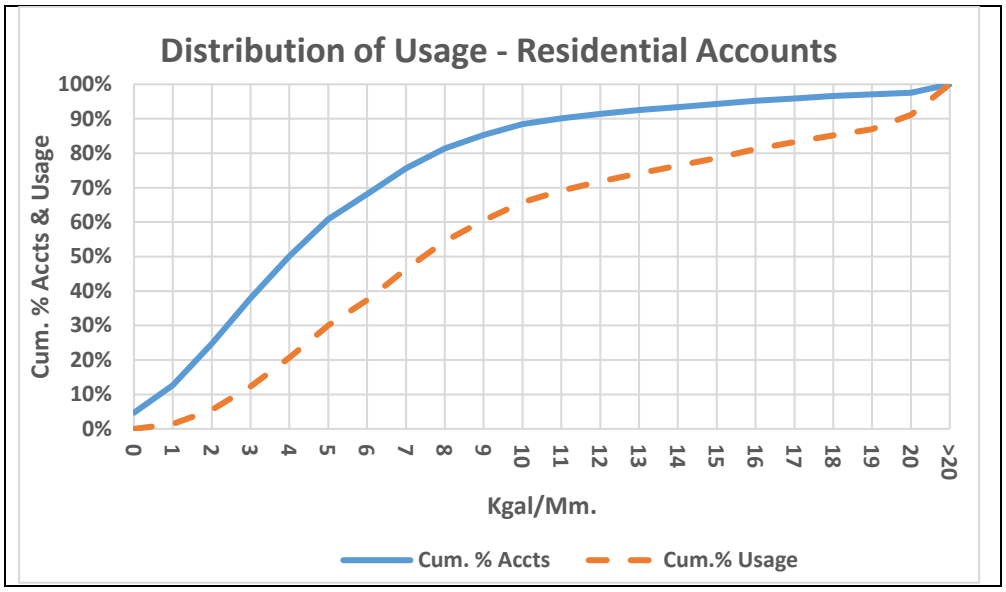

3.4.2 Residential – Top Users

The following table lists the top 25 residential consumers by usage. Eleven of these accounts are serviced with 1-inch meters. Several accounts highlighted used less water in 2022 than 2021.

TOP RESIDENTIAL CONSUMERS

Book No.	Acct No.	Occup. No.	Name	Class Code	Mtr Size	Mtr Age	2022 Total Kgal	2021 total Kgal	2022 Kgal/M	2021 Kgal/M
05	1000	00	HILL	RES	5/8	2020	500	277	41.63	23.08
05	1541	01	PRUETT	RES	1	2014	488	463	40.64	38.56
05	2940	03	GERREN	RES	1	2014	390	300	32.47	24.98
05	1600	01	PERRY	RES	5/8	2014	380	357	31.68	29.74
05	3605	01	HANSON II	RES	5/8	2014	363	186	30.25	15.46
05	3325	03	HROMCIK	RES	1	2014	362	350	30.18	29.17
05	3540	01	STONE	RES	1	2014	362	248	30.16	20.70
05	3495	06	WULFF	RES	5/8	2020	350	167	29.13	13.89
05	3670	00	WEED	RES	5/8	2020	347	305	28.93	25.41
05	3795	02	BURNS	RES	5/8	2021	347	203	28.93	16.95
05	3215	00	KUCHERA	RES	1	2014	346	275	28.79	22.88
05	1540	05	MASEK	RES	1	2014	339	277	28.26	23.11
05	1415	00	KING	RES	5/8	2014	336	325	28.03	27.11
05	3185	03	COOKE	RES	1	2014	329	245	27.42	20.39
05	1454	01	ALEXANDER	RES	1	2014	328	202	27.34	16.81
05	1635	00	BURROUGH	RES	5/8	2021	320	272	26.65	22.68
05	1815	01	GILLESS	RES	1	2014	314	241	26.18	20.07
05	3115	00	EARLEY	RES	5/8	2014	304	230	25.29	19.18
05	3665	05	ROGERS	RES	5/8	2021	302	385	25.17	32.05
05	0290	00	SIFUENTES	RES	1	2014	299	201	24.90	16.71
05	1490	02	LAGRONE	RES	5/8	2019	298	226	24.87	18.82
05	3220	00	GOERES	RES	5/8	2014	296	362	24.70	30.14
03	0610	01	MURRAY	RES	5/8	2014	287	59	23.93	4.89
05	3675	06	MONZINGO	RES	5/8	2021	287	185	23.88	15.41
05	0980	00	RASH	RES	5/8	2014	282	297	23.47	24.74
05	3485	01	FISHER	RES	1	2014	270	151	22.53	12.56

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3.5 COMMERCIAL ACCOUNTS

3.5.1 Commercial and Industrial Accounts

For the purpose of this report, Churches, EMP and Hospital accounts are included with the review of commercial accounts and collectively they make up about 11.2% of the system total but consume approximately 13% of the usage. The following table shows the usage by meter size for this category. Over 69% of these accounts are served by 5/8X3/4-inch meters and consume 32.8% of the usage. Nearly 45% of the metered water of this category is through 2-inch and larger meters.

DISTRIBUTION OF COMMERCIAL ACCOUNTS METER SIZE

Mtr Size	No. Accts	2022 Kgal	2021 Kgal	2020 Kgal	2022 Kgal/M	2021 Kgal/M	% Accts	% Usage
5/8	150	7,828	7,339	6,600	4.34	4.07	69.4%	32.8%
1	38	5,122	4,874	4,156	11.23	10.68	17.6%	21.5%
1.5	6	225	245	277	3.12	3.41	2.8%	0.9%
2	18	10,457	9,805	7,837	48.41	45.40	8.3%	43.8%
3	1	2	987	1,838	0.18	82.26	0.5%	0.0%
4	3	228	111	109	6.34	3.08	1.4%	1.0%
Total	**216**	**23,862**	**23,361**	**20,817**	**9.20**	**9.01**	**100.0%**	**100.0%**

3.5.2 Distribution of Use – Commercial Accounts

The following table and chart show that over 55% of commercial accounts are considered low use (2,000 gallons or less); approximately 81% of the accounts use 10,000 gallons per month or less and consume only 20.5% of the water. Approximately 3.2% of the commercial accounts use over 39% of the water. All commercial accounts and consumption history is included in the Appendix.

DISTRIBUTION OF USAGE – COMMERCIAL ACCOUNTS

Kgal/M	Cum. % Accts	Cum.% Usage	Kgal/M	Cum. % Accts	Cum.% Usage
0	7.9%	0.0%	9	80.1%	20.0%
1	43.5%	3.9%	10	80.6%	20.5%
2	55.1%	6.4%	11	81.9%	22.2%
3	63.0%	8.9%	15	86.6%	29.1%
4	67.6%	10.9%	20	89.8%	35.4%
5	69.4%	11.9%	25	91.7%	40.0%

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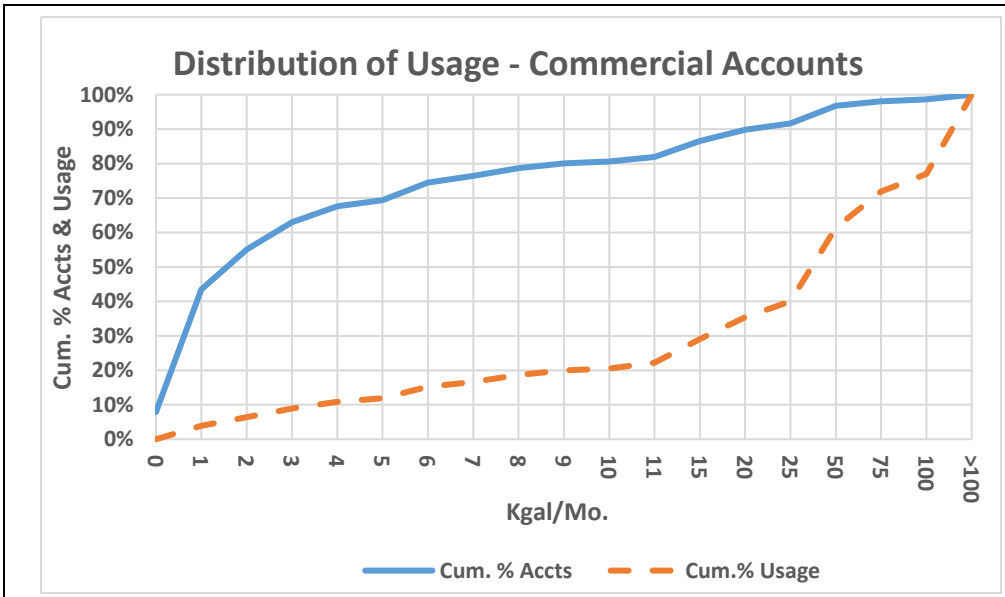
Kgal/M	Cum. % Accts	Cum.% Usage	Kgal/M	Cum. % Accts	Cum.% Usage
6	74.5%	15.2%	50	96.8%	61.4%
7	76.4%	16.6%	75	98.1%	71.9%
8	78.7%	18.7%	100	98.6%	77.0%
9	80.1%	20.0%	>100	100.0%	100.0%

DISTRIBUTION OF USAGE – COMMERCIAL ACCOUNTS



3.5.3 Top Commercial Users

The following table lists the top commercial users. Two of these accounts (Quality Inn and Julio's Mexican Restaurant are serviced by 5/8x3/4-inch meters and have already surpassed 3.6 MG of total registration and the City should considerer replacing both meters.

All commercial accounts are listed in the Appendix.

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TOP COMMERCIAL USERS

Rte No.	Acct No.	Occup No.	Name	Class Code	Mtr Size	Mtr Age	Lst Read Kgal	2022 Total Kgal
04	2730	03	T-N-T CARWASH	COM	2	2014	23,554	3,588
04	2150	01	ROCKDALE INN MOTEL	COM	2	2021	1,966	1,316
02	1067	01	DAYS INN	COM	2	2014	7,757	1,266
04	2750	01	FALLS CAPITAL INC.	COM	1	2021	1,513	1,222
04	1581	00	GILL'S BUDGET INN	COM	2	2014	7,413	908
02	1072	01	OM NILKHANTH NAMAH, LLC	COM	1	2019	2,828	801
04	0391	01	WAL-MART STORES TEXAS, LP	COM	2	2014	9,107	788
04	3391	02	QUALITY INN HPY LLC	COM	5/8	>10	7,261	623
04	2155	00	SONIC DRIVE IN # 18	COM	5/8	2020	1,087	558
02	0120	02	GNS PARMJIT DHALIWAL	COM	2	2021	756	523
02	1055	00	REGENCY INN	COM	2	2021	782	506
04	3005	01	JULIO'S RESTAURANT	COM	5/8	2015	3,624	482
02	2945	00	PARSLEY'S FOOD SERV.(LEE'S)	COM	5/8	2021	673	449
04	2526	00	CENTRAL COUNTIES SERVICES	COM	1	2014	1,993	429
04	2735	02	MCDONALDS	COM	2	2014	4,504	403
04	3389	01	TAQUERIA BANDA'S	COM	1	2014	3,664	401
04	2690	03	CEFCO FOOD STORES	COM	1	2014	3,358	389
04	0393	00	MURPHY OIL USA INC	COM	5/8	2014	885	352
04	1640	03	THE CARWASH	COM	2	2021	481	294
02	2950	03	TEXAS BURGER/SUBWAY	COM	5/8	2021	466	288
04	3335	03	GONZALES MEXICAN BAR &	COM	5/8	2021	451	273
01	0224	03	ESTEBAN E VASQUEZ	COM	5/8	2020	548	255
04	2911	00	LOVE AND LEARNING CENTER	COM	5/8	2020	365	239
04	1605	00	BROOKSHIRE BROTHERS INC	COM	2	>10	7,171	234
04	1610	04	SNAP FITNESS	COM	5/8	2020	281	231

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3.6 FAMILY MULTI-UNIT - RV ACCOUNTS – TRAILER PARKS

3.6.1 Multi-Unit Family Accounts

There are 28 apartment, RV, trailer parks or nursing home accounts that serve multiple units. Unfortunately, the lone nursing home in the City and RV or trailer parks do not list units served. These accounts and their consumption are listed below.

It is suggested that the City track the number of units served at RV, Trailer Parks and Nursing homes.

APARTMENTS-NURSING HOME-RV-TRAILER PARKS

Rte No.	Acct No.	Occ. No.	Name	Class Code	No. Unit	Mtr Sz	Mtr Age	Last Read Kgal	Kgal/M /Unit	2022 Total Kgal	2022 Kgal /M
2	892	0	HUNTR CHASE APT	Apts	80	3	2,022	6,632	1.95	1,873	156.09
1	1275	0	HOUSING AUTH	Apts	60	3	2,021	6,429	5.88	4,231	352.55
4	2628	3	CGCB PROPERTIES,	Apts	32	4	>10	1,565	0.05	19	1.58
1	1215	2	ROCKDALE APT	Apts	27	2	2,021	1,467	3.04	984	82.03
4	2120	0	MCCAWLEY OAKS	Apts	15	2	2,014	4,187	3.07	552	45.97
4	1800	0	MCCAWLEY OAKS	Apts	15	2	2,014	4,155	2.67	481	40.07
4	2125	0	MCCAWLEY OAKS	Apts	15	2	2,014	3,564	2.14	386	32.19
4	1805	0	MCCAWLEY OAKS	Apts	15	2	2,014	2,215	0.70	126	10.50
4	2425	3	TOWN OAK APT	Apts	14	2	2,014	3,671	2.02	340	28.37
4	2625	1	MEADOW DR APT	Apts	12	2	2,014	7,065	4.76	686	57.15
5	10	2	FIRST STEP FREEDO	Apts	10	2	2,014	3,694	5.08	610	50.87
4	2985	1	ZIMMERMAN, M	Apts	10	2	2,014	3,648	4.22	506	42.14
5	15	4	EMERALD REAL EST	Apts	10	2	2,014	3,613	3.40	408	34.00
4	3020	1	ZIMMERMAN, M	Apts	10	2	2,014	2,888	2.23	268	22.35
4	3250	3	JC APARTMENTS	Apts	4	1	2,020	866	2.15	103	8.55
2	2964	98	HAROLD COOPER	Apts	4	2	2,020	163	1.73	83	6.89
4	609	20	RAY MENDOZA	Apts	2	1	2,014	398	0.75	18	1.46
2	1050	2	LOS ROBLES MHP	MH	1	4	2,020	4,360	168.25	2,019	168.28
4	4002	1	ROCKDALE REHAB	NUR	1	2	2,020	4,105	164.67	1,976	164.70
4	2628	3	CGCB PROPERTIES,	Apts	1	1	2,014	13,998	120.67	1,448	120.63
4	3394	0	SHADY GROVE RV	RV	1	2	2,014	9,052	96.92	1,163	96.94
4	3385	2	DAVID VELA	MH	1	2	2,014	8,859	61.25	735	61.26
4	3392	2	SHADY OAK RV	RV	1	2	2,014	3,997	49.17	590	49.19
2	203	1	KD45 HOLDIN RV	RV	1	1	2,014	4,169	40.08	481	40.08
2	1136	3	TEXTIN PROPERT	RV	1	1	2,014	485	12.92	155	12.88
4	1660	0	MCCAWLEY OAKS	Apts	1	1	2,014	395	5.50	66	5.53

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Rte No.	Acct No.	Occ. No.	Name	Class Code	No. Unit	Mtr Sz	Mtr Age	Last Read Kgal	Kgal/M /Unit	2022 Total Kgal	2022 Kgal /M
2	2962	1	JIM GIBSON	Apts	1	1	2,021	27	1.42	17	1.44
2	2940	3	ROGER BAGGERLY	RV	1	1	2,014	792	0.00	0	0.00

It should be noted that 17 apartment accounts list units served. The average usage per month per unit for these accounts is approximately 2.9 Kgal/mo. The average usage of a single residential account is approximately 5.6 Kgal/mo. The residential equivalent of apartment units is approximately 52% of a single-family residential account. There are seven accounts in the above table that average less than 2 Kgal/month/unit.

3.6.2 Usage Distribution by Meter Size

The following tables summarize usage by meter size and units served. Over 46% of the multi-unit accounts are serviced with a 2-inch meter and they represent 40% of this category and the combined usage is 44% of the total.

DISTRIBUTION OF USAGE BY METER SIZE - APARTMENTS

Mtr Size	No. Accts	No. Units	2022 Kgal	2021 Kgal	2020 Kgal	2022 Kgal/M	2021 Kgal/M	2020 Kgal/M	% Accts	% Usage
5/8	2	3	35	30	29	1.45	1.27	1.17	7.1%	0.2%
1	6	9	2,253	2,278	2,444	31.28	31.64	33.93	21.4%	11.1%
1.5	3	24	857	989	734	23.79	27.49	20.38	10.7%	4.2%
2	13	137	9,037	8,750	8,375	57.94	56.08	53.69	46.4%	44.5%
3	2	140	6,104	4,993	5,209	254.32	208.04	217.04	7.1%	30.0%
4	2	33	2,038	2,173	2,292	84.93	90.53	95.49	7.1%	10.0%
Total	**28**	**346**	**20,324**	**19,213**	**19,083**	**60.49**	**57.18**	**56.79**	**100.0%**	**100.0%**

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3.7 IRRIGATION ACCOUNTS

3.7.1 Irrigation Accounts – Usage by Meter Size

There are only 32 separate irrigation accounts listed in the database transfer. For the purpose of this report, the "irrigation" class code was developed. The following table lists these accounts and the usage represented by each. The first 8 accounts listed in the table indicate declining usage from the previous year and may have meter accuracy issues.

IRRIGATION ACCOUNTS

Rte No.	Acct No.	Occup No.	Name	Class Code	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal	2021 Kgal	2022 Kgal/M	2021 Kgal/M
04	1669	01	O'REILLY AUTO ENTERPRISES, LLC	Irrig	1	2020	2,990	559	966	46.56	80.47
04	0391	01	WAL-MART STORES TEXAS, LP	Irrig	2	2014	20,990	448	810	37.34	67.53
04	3391	02	QUALITY INN HPY LLC	Irrig	1	2014	2,456	0	285	0.00	23.72
04	3122	00	ROCKDALE FED CREDIT UNION	Irrig	1	2014	5,014	597	672	49.73	55.96
04	3000	01	CLASSIC BANK NA	Irrig	1.5	2014	2,522	284	321	23.70	26.72
03	0825	00	FIRST CHRISTIAN CHURCH	Irrig	5/8	2014	1,590	115	133	9.58	11.10
05	1536	00	HAL REAGAN	Irrig	1	2014	2,172	202	217	16.83	18.08
04	2814	00	MICHELLE LEHMKUHL ATTORNEY	Irrig	1	2014	1,622	126	134	10.47	11.13
01	0255	01	CITIZENS NATIONAL BANK	Irrig	5/8	2014	0	0	0	0.00	0.00
04	0387	02	VIA REAL ESTATE, LLC	Irrig	1	2022	0	0	0	0.00	0.00
04	0695	01	CROSSROADS BIBLE CHURCH	Irrig	5/8	2021	0	0	0	0.00	0.02
05	1005	03	STEPHEN WOTRING	Irrig	1	2014	0	0	0	0.00	0.00
02	1067	01	DAYS INN	Irrig	2	2021	792	0	0	0.00	0.00
05	1410	04	CHARLIE HALL	Irrig	1	2014	0	0	0	0.00	0.00
05	1670	05	JOE GUTIERREZ	Irrig	1	2014	0	0	0	0.00	0.00
05	3480	00	ROCKDALE CHRISTIAN CHURCH	Irrig	1	2014	0	0	0	0.00	0.00
05	3650	02	RONALD RABINOWITZ	Irrig	1	2014	0	0	0	0.00	0.00
05	3740	00	JUDITH MATULA	Irrig	1	2014	1,260	0	0	0.03	0.00
05	1625	06	STELLA F JENNINGS	Irrig	5/8	2020	88	34	22	2.81	1.82
01	2070	00	ST JOSEPH CATHOLIC CHURCH	Irrig	1	2014	107	24	8	1.98	0.63
04	2605	00	MEADOWBROOK BAPTIST CHURC	Irrig	1	2020	2,084	242	220	20.17	18.30
05	1450	06	COURTNEY GOULDING	Irrig	1	2014	438	70	47	5.83	3.95
05	3710	00	BARRY PHILLIPS	Irrig	1	2014	1,290	166	108	13.81	9.03
04	2115	00	CHAMBER OF COMMERCE	Irrig	1	2018	265	135	54	11.23	4.50
01	0635	00	DALE TALLEY	Irrig	1	2014	995	207	108	17.23	8.99
01	2060	04	WENDIE UPSON	Irrig	5/8	2019	593	229	119	19.06	9.95
05	0020	00	AUSTIN TEXAS FM GROUP	Irrig	1	2014	2,517	459	339	38.23	28.23
05	3605	01	JOSEPH HANSON II	Irrig	5/8	2014	2,142	363	186	30.25	15.46
04	2665	01	CITIZENS NATIONAL BANK	Irrig	1.5	2020	1,122	537	328	44.74	27.36
02	0285	00	RAINBOW COURTS MOTEL	Irrig	1	2014	4,846	695	457	57.88	38.07
04	2735	02	MCDONALDS	Irrig	1	2014	2,886	491	155	40.88	12.95
02	0892	00	HUNTERS CHASE SENIOR APTS, LP	Irrig	1.5	2021	527	527	0	43.88	0.00

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Irrigation sprinkler heads are prone to leak. Often the leakage rate is below the accuracy tolerances of larger water meters and the leakage is not recorded. This quantity of lost water due to leaking sprinklers is not only unaccounted-for water but is non-revenue water valued at the retail rate.

Irrigation meters should not be difficult to size, since sprinkler heads generally distribute 1.5-2.5 gpm per head depending upon pressure and manufacturer. The key is to know how many sprinkler heads are operating at one time. Sprinkler systems are a source of NRW because many heads tend to leak. If the meter is oversized, the leaking water will never be registered on the meter.

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3.8 METER AGE & TOTAL METERED REGISTRATION

3.8.1 Theoretical Meter Life Expectancy

Meter manufacturers have estimated that under normal use and water quality conditions, 5/8-inch meters have a theoretical life expectancy (TLE) of approximately 1.5 million gallons. However, actual meter life expectancy is dependent on water quality, usage rates, meter age and meter quality. High use accounts, in the right conditions, can easily exceed the 1.5 MG threshold by several times for 5/8x3/4-inch meters and maintain good accuracy. The same is true for all other meter sizes and types.

The following table projects meter life expectancy in MG and was developed for guideline purposes only. As stated previously, water quality and usage rates of flow impact these numbers. The TLE for the multi-jet meters is based on the gallons per minute factor of each meter, using 5/8x3/4-inch as the base. The TLE for turbines is based on manufacturers suggested life.

ESTIMATED METER THEORETICAL LIFE EXPECTANCES

Meter Size	Rate GPM	GPM Factor	TLE MG
5/8	20	1.0	1.5
3/4	30	1.5	2.3
1	50	2.5	3.8
1.5	100	5.0	7.5
2	160	8.0	12.0
2-Turbine	200	10.0	30.0
3- Turbine	450	22.5	75.0
4- Turbine	1,000	50.0	150.0
6- Turbine	2,000	100.0	500.0
8- Turbine	4,000	200.0	800.0
10- Turbine	5,500	275.0	1,500.0

3.8.2 5/8-Inch Residential Meter Age Review

Meter age has long been a parameter used by many utilities to determine meter change-out frequencies. Meter age is a good barometer, when coupled with total metered registration.

Meter age is rounded off to the nearest integer. For instance, if a meter is 10.4 years old, it is rounded off to 10 years. The following table reviews average consumption per account and low use accounts based on meter age. This table does not take into consideration variables such as demographics.

The table shows that nearly 37% of the meters installed were in 2014 with another 35% in 2021. Over 29% of the low use accounts occurred in the 2014 installations and approximately 40% in the 2021 installations. The high number of low use accounts in 2021 would help explain for the lower consumption in this age group. However, the 2014

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installations average approximately 1,500 gallons/month/acct more than its 2021 counterparts.

5/8-INCH RESIDENTIAL METERS BY AGE

Mtr Age Res.	No. Accts	% Accts	No. Low Use Accts	% Low Use Accts	2022 Kgal/M/ Acct	2021 Kgal/M/ Acct	2020 Kgal/M/ Acct
2013	19	1.0%	3	0.8%	7.28	7.52	7.45
2014	674	36.8%	112	29.4%	6.33	5.63	5.94
2015	14	0.8%	4	1.0%	3.91	4.01	3.55
2016	12	0.7%	5	1.3%	5.68	4.94	6.29
2017	2	0.1%	1	0.3%	3.30	5.35	6.26
2018	7	0.4%	1	0.3%	8.07	7.73	6.32
2019	71	3.9%	6	1.6%	7.64	6.61	7.13
2020	374	20.4%	76	19.9%	5.24	4.66	4.84
2021	634	34.6%	154	40.4%	4.82	4.51	4.61
2022	27	1.5%	19	5.0%	2.08	0.57	0.72
Total	**1,834**	**100.0%**	**381**	**100.0%**	**5.57**	**5.02**	**5.23**

Residential meters were then grouped in 2-year and 5-year time periods. Since demographics is not revealed in these tables, it appears the older meters are recording higher usage than the newer meters.

TWO YEAR TOTAL INSTALLATIONS

2 Year Mtr Age	No. Accts	% Accts	No. Low Use Accts	% Low Use Accts	2022 Total Kgal	Kgal/M /Acct
2013-2014	693	37.8%	115	30.2%	52,857	6.36
2015-2016	26	1.4%	9	2.4%	1,475	4.73
2017-2018	9	0.5%	2	0.5%	757	7.01
2019-2020	445	24.3%	82	21.5%	30,026	5.62
2021-2022	661	36.0%	173	45.4%	37,344	4.71
Totals	**1,834**	**100.0%**	**381**	**100.0%**	**122,459**	**5.56**

FIVE YEAR TOTAL INSTALLATIONS

5 Year Mtr Age	No. Accts	% Accts	No. Low Use Accts	% Low Use Accts	2022 Kgal	Kgal/M /Acct
2013-2017	721	39.3%	125	32.8%	54,411	6.29
2018-2022	1,113	60.7%	256	67.2%	68,049	5.10
Totals	**1,834**	**100.0%**	**381**	**100.0%**	**122,460**	**5.56**

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The following table compares the 5-year and 2-year blocks and payback potential. *Since there are many unknowns such as demographics, replacement of registers, reading errors, etc., the cost analysis was based on a 50% discount factor.* The table shows that the oldest meters have the highest average usage per account. The combined water and sewer commodity charge is $11.20/Kgal and the meter replacement cost is $289 each.

METER AGE AND METER PAYBACK POTENTIAL

5 Year Mtr Age Group	No. Accts	Kgal/M /Acct	2022 Kgal	Diff Kgal/M	$/Yr @50% adjustment	Mtr Rep Cost $	Yrs Payback
2013-2017	721	6.29	54,411	0	$0	0	0
2018-2022	1,113	5.10	68,049	1.19	$89,004	$321,657	3.6
Totals	**1,834**	**5.56**	**122,460**	**0.73**	**$89,004**		**NA**
2 Year Mtr Age Group	**No. Accts**	**Kgal/M /Acct**	**2022 Kgal**	**Diff Kgal/M**	**$/Yr @50% adjust**	**Mtr Rep Cost $**	**Yrs Payback**
2013-2014	693	6.36	52,856	0	$0	$0	0.0
2015-2016	26	4.73	1,474	1.63	$2,848	$7,514	2.6
2017-2018	9	7.01	7,578	0	$0	$0	0.0
2019-2020	445	5.62	30,026	0.74	$22,129	$128,605	5.8
2021-2022	661	4.71	373,448	1.65	$73,292	$191,029	2.6
Totals	**1,834**	**5.56**	**122,459**	**0.8**	**$98,596**	**$327,148**	**NA**

3.8.3 5/8-Inch Meter Life Expectancy

Meter performance and life expectancy are critical factors in maintaining high levels of water use accountability and revenue.

Based on an average usage of about 5.6 Kgal per month for this meter size, it would take approximately 22 years to reach 1.5 MG. It is not likely that any 5/8X3/4-inch meter will retain a high level of accuracy for this duration. In addition, as the City moves toward AMI meter reading technology, it will be important that the meter life must at least equal the battery life. The following table shows how much registration can be expected based on monthly usage and various years installed.

PROJECTED REGISTRATION BASED ON MONTHLY USAGE AND YEARS INSTALLED

Kgal/M	Kgal/Yr	Kgal - 10 Yr	Kgal - 12 Yr	Kgal - 15 Yr	Kgal/M	Kgal/Yr	Kgal - 10 Yr	Kgal - 12 Yr	Kgal - 15 Yr
1	12	120	144	180	7	84	840	1,008	1,260
2	24	240	288	360	8	96	960	1,152	1,440
3	36	360	432	540	9	108	1,080	1,296	1,620
4	48	480	576	720	10	120	1,200	1,440	1,800
5	60	600	720	900	12	144	1,440	1,728	2,160
5.6	67	670	804	1,005	15	180	1,800	2,160	2,700
6	72	720	864	1,080	20	240	2,400	2,880	3,600

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At 5.6 Kgal/month, a twelve-year meter life expectancy would project to just 0.804 MG, and a ten-year life would be less than 700 Kgal.

The following table shows total registration for small meters ranging from zero gallons to greater than five million gallons.

5/8X3/4-INCH METER TOTAL REGISTRATION

Total Registration	No. Accts	% Accts	Cum. % Accts	2022 Kgal/M	2021 Kgal/M	2020 Kgal/M
0-100	755	44.1%	44.1%	1,718.0	1,684.0	1,916.9
101-200	383	22.4%	66.5%	2,271.5	2,115.4	2,074.4
201-300	254	14.8%	81.3%	1,806.7	1,568.4	1,518.3
401-500	91	5.3%	86.6%	560.3	498.5	525.5
501-600	77	4.5%	91.1%	590.3	514.6	534.5
601-700	40	2.3%	93.4%	351.7	292.4	292.1
701-800	35	2.0%	95.4%	340.0	275.8	273.6
801-900	17	1.0%	96.4%	150.6	126.1	112.7
901-1000	12	0.7%	97.1%	104.2	85.9	90.2
1001-1500	31	1.8%	98.9%	412.6	372.6	363.3
1501-2000	5	0.3%	99.2%	63.3	62.4	87.2
2001-3000	9	0.5%	99.7%	223.4	196.3	198.2
3001-4000	2	0.1%	99.8%	52.0	66.5	55.1
4001-5000	1	0.1%	99.9%	72.8	0.0	0.0
>5000	1	0.1%	100.0%	51.9	32.8	17.3

The billing database lists 50 small meter accounts that have exceeded 1.0 MG. These accounts average 17.9 Kgal/month and most of these were installed in 2014.

5/8-INCH METERS WITH HIGH REGISTATIONS

Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
04	3391	02	QUALITY INN HPY LLC	COM	1	5/8	>10	7,261	51.94
02	1781	00	SUMUEL PARK	MUN	1	5/8	2022	4,591	72.77
04	3005	01	JULIO'S RESTAURANT	COM	1	5/8	2015	3,624	40.19
04	2800	03	ORIENTAL KITCHEN	COM	1	5/8	2014	3,298	11.83
05	1600	01	DIANA M PERRY	RES	1	5/8	2014	2,981	31.68
05	1415	00	JOHN KING	RES	1	5/8	2014	2,597	28.03
05	0980	00	LOIS RASH	RES	1	5/8	2014	2,382	23.47
05	3220	00	GLEN GOERES	RES	1	5/8	2014	2,312	24.70
05	3770	01	TOM R COFFIELD	RES	1	5/8	2013	2,262	21.99
05	3195	03	BRYAN GRAHAM	RES	1	5/8	2014	2,220	18.81
05	3605	01	JOSEPH HANSON II	Irrig	1	5/8	2014	2,142	30.25
05	0260	01	DAVID TAYLOR	RES	1	5/8	2014	2,117	19.14
05	3115	00	JAMES EARLEY	RES	1	5/8	2014	2,058	25.29
05	3200	02	HENRY (SONNY) LILLARD	RES	1	5/8	2014	1,846	20.02

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Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
05	3645	06	AMADOR BAGGERLY	RES	1	5/8	2013	1,841	11.51
05	1985	00	THOMAS R. MALDONADO	RES	1	5/8	2014	1,653	16.18
03	0825	00	FIRST CHRISTIAN CHURCH	Irrig	1	5/8	2014	1,590	9.58
05	1460	01	KARISSA D MARTINEZ	RES	1	5/8	2014	1,589	5.97
05	1715	00	DON R WARDLOW	RES	1	5/8	2014	1,497	16.90
05	3160	04	MIKE/SHAWN HORNUNG	RES	1	5/8	2013	1,474	18.93
05	3180	00	GARY GRIESBACH	RES	1	5/8	2013	1,456	14.95
05	0915	00	LINDA E. GIFFORD	RES	1	5/8	2014	1,415	8.14
05	1555	02	LINDA MASSEY	RES	1	5/8	2014	1,357	13.44
04	1020	01	TRIPP'S TAVERN	COM	1	5/8	2014	1,340	18.05
04	4000	00	ROCKDALE IND SCHOOL	SCH	1	5/8	2014	1,328	12.94
05	1764	06	BARBARA TAYLOR	RES	1	5/8	2014	1,323	13.46
05	1385	01	RONALD BARCUCH	RES	1	5/8	2014	1,310	13.58
05	1995	00	JAMES THROCKMORTON	RES	1	5/8	2014	1,306	9.85
05	1425	01	REBEKAH HALL	RES	1	5/8	2014	1,302	15.24
05	0575	01	NOELIA COOKE	RES	1	5/8	2014	1,263	15.86
05	1505	01	CASSIE CAFFEY	RES	1	5/8	2014	1,216	16.78
04	0665	00	BLANCHE RUBIO	RES	1	5/8	2014	1,195	8.08
05	2380	00	W D WHORTON	RES	1	5/8	2014	1,176	7.61
05	1471	03	TERRI ADAIR	RES	1	5/8	2014	1,175	12.82
05	1580	00	MIKE WALKER	RES	1	5/8	2014	1,158	11.93
05	1575	02	BETHANY A SIMMONS	RES	1	5/8	2014	1,126	5.20
05	1300	01	ROSEMARY NIETO	RES	1	5/8	2014	1,115	10.95
05	1250	02	DARREN VEIT	RES	1	5/8	2014	1,111	10.51
05	1630	03	MICHAEL/LANI YOUNG	RES	1	5/8	2014	1,098	8.34
05	1135	00	SARA PROCTOR	RES	1	5/8	2014	1,094	12.36
04	1760	01	JOHN KEVIN ROBERTS	RES	1	5/8	2014	1,092	8.39
04	2155	00	SONIC DRIVE IN # 18	COM	1	5/8	2020	1,087	46.52
03	0687	00	CITY OF ROCKDALE (VFD)	MUN	1	5/8	2015	1,086	26.13
05	3801	03	CHRISTINA DOSS-JIMINEZ	RES	1	5/8	2014	1,082	9.98
05	1090	01	LEAH THOMASON	RES	1	5/8	2014	1,077	9.47
04	2900	02	TERESA KNIGHT	RES	1	5/8	2014	1,054	3.12
05	1710	00	DOROTHY ANDERSON	RES	1	5/8	2014	1,041	12.41
05	0340	00	BARRY BRIGGS	RES	1	5/8	2014	1,023	13.41
04	1875	01	CHARLOTTE STARR	RES	1	5/8	2014	1,019	7.22

3.8.4 High Use 5/8x3/4-inch Meters

The following table lists all small meter accounts that consumed 300 Kgal or more in 2022. Although the database lists these as 3/4-inch meters, they are 5/8x3/4 inch and several should be upsized to either a full 3/4-inch or 1-inch meters. They will be discussed in the meter sizing section of this report.

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Rte No.	Acct No.	Occup No.	Name	Class Code	Mtr Size	Mtr Age	Lst Read Kgal	2022 Kgal	2022 Kgal/M
02	1781	00	SUMUEL PARK	MUN	5/8	2022	4,591	873	72.77
04	3391	02	QUALITY INN HPY LLC	COM	5/8	>10	7,261	623	51.94
04	2155	00	SONIC DRIVE IN # 18	COM	5/8	2020	1,087	558	46.52
05	1000	00	NATALIE HILL	RES	5/8	2020	770	500	41.63
04	3005	01	JULIO'S RESTAURANT	COM	5/8	2015	3,624	482	40.19
02	2945	00	PARSLEY'S FOOD SERV.	COM	5/8	2021	673	449	37.38
05	1600	01	DIANA M PERRY	RES	5/8	2014	2,981	380	31.68
05	3605	01	JOSEPH HANSON II	Irrig	5/8	2014	2,142	363	30.25
04	0393	00	MURPHY OIL USA INC	COM	5/8	2014	885	352	29.32
05	3495	06	ERIKA WULFF	RES	5/8	2020	505	350	29.13
05	3795	02	R L BURNS	RES	5/8	2021	514	347	28.93
05	3670	00	DR JOHN M WEED III	RES	5/8	2020	628	347	28.93
05	1415	00	JOHN KING	RES	5/8	2014	2,597	336	28.03
05	1635	00	FRANK BURROUGH	RES	5/8	2021	563	320	26.65
03	0687	00	CITY OF ROCKDALE (VFD)	MUN	5/8	2015	1,086	314	26.13
05	3115	00	JAMES EARLEY	RES	5/8	2014	2,058	304	25.29
05	3665	05	CHARLOTTE ROGERS	RES	5/8	2021	576	302	25.17

3.10 DECLINING USAGE

Declining usage was reviewed by several parameters including meter size, class code, and meter route in order to see if a pattern existed. However, declining accounts were scattered throughout the City and a “smoking gun” does not appear to stand out. There were 852 accounts that consumed less water in 2022 compared to the previous 12 months. For most accounts, the difference was small and considered insignificant. A total of 434 (non-irrigation) of these accounts dropped at least 12,000 gallons/year or 1 kgal/month or more on average. The drop in usage for these accounts totaled more than 16 MG for the year. Since we do not know the reason for the drop in usage for these accounts (meter error, reading issues, leaks repaired, etc.) we have assumed that half of the drop in usage is recoverable with meter replacement and proper sizing.

3.10.1 Declining Usage by Class Code –All Accounts

Since the billing database transfer ended in October 2022, a comparison of account usage was made back to November 2021.

The following table shows the net difference in usage between 2022 and 2021 by class code for the declining use accounts. Residential customers account for nearly 63% of the reduced usage. Commercial customers represent 17.5% of the total decline.

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DECLINING USE ACCOUNTS BY CLASS CODE

Class Code	No. Accts	2022 Kgal/M/ Acct	2021 Kgal/M/ Acct	Diff Kgal/M/ Acct	% Accts	% Declining Kgal
APT	6	47.17	55.65	(8.48)	0.7%	2.7%
CH	17	1.66	3.45	(1.79)	2.0%	1.6%
COM	85	4.87	8.71	(3.84)	10.0%	17.5%
EMP	1	0.73	1.41	(0.68)	0.1%	0.0%
HOS	1	0.00	0.08	(0.08)	0.1%	0.0%
IRRIG	8	24.28	36.84	(12.56)	0.9%	5.4%
MH	2	114.77	129.28	(14.51)	0.2%	1.6%
MUN	8	29.54	37.40	(7.86)	0.9%	3.4%
RES	715	3.96	5.60	(1.64)	83.9%	63.0%
RV	3	45.67	53.73	(8.06)	0.4%	1.3%
SCH	6	15.23	25.97	(10.74)	0.7%	3.5%
Total	**852**	**5.21**	**7.40**	**(2.19)**	**100%**	**100%**

3.10.2 Declining Usage Accounts by Meter Size

The following table breaks down declining usage by meter size and shows that 80% of accounts with declining usage were serviced by small meters and they represented 59% of the decline in usage. Two-inch and larger meters represented 3.1% of the total accounts and over 21% of the declining usage.

DECLINING USAGE BY METER SIZE

Mtr Size	No. Accts	2022 Kgal/M	2021 Kgal/M	Diff Kgal/M	% Accts	% Decline Kgal
0.6	680	3.86	5.46	(1.60)	79.8%	58.5%
1	137	5.24	7.48	(2.24)	16.1%	16.5%
1.5	8	9.26	14.88	(5.62)	0.9%	2.4%
2	20	31.52	43.78	(12.26)	2.3%	13.2%
3	3	57.04	94.53	(37.49)	0.4%	6.0%
4	3	57.65	67.87	(10.22)	0.4%	1.6%
NA	1	46.56	80.47	(33.91)	0.1%	1.8%
Total	852	5.21	7.39	(2.18)	100.0%	100.0%

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3.10.4 Top 100 Declining Usage Accounts

The following table lists the top 100 declining use accounts. The declining usage for these accounts exceeds 423 Kgal/month. As previously mentioned, Perry & Perry Builders used an extra million gallons during the freeze of February 2021.

TOP DECLINING USE ACCOUNTS

Rte No.	Acct No.	Occu No.	Name	Class Code	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/ M	2021 Kgal/ M	Usage Change 2022-2021 Kgal/M
04	2761	02	PERRY & PERRY BUILDERS	COM	2	2014	1,059	0.88	87.25	(86.4)
01	1630	04	YOUTH OPPORTUNITY INVEST	COM	3	2014	9,397	0.18	82.26	(82.1)
04	1005	00	CITY OF ROCKDALE	MUN	2	>10	45,254	221.42	268.08	(46.7)
04	1669	01	O'REILLY AUTO ENTERPRISES,	IRRIG	1	2020	2,990	46.56	80.47	(33.9)
04	0391	01	WAL-MART STORES TEXAS, LP	IRRIG	2	2014	20,990	37.34	67.53	(30.2)
03	1681	00	JONATHAN MUSTON	RES	1.5	2014	1,086	5.49	29.96	(24.5)
04	3391	02	QUALITY INN HPY LLC	IRRIG	1	2014	2,456	0.00	23.72	(23.7)
03	1440	00	ROCKDALE IND SCHOOL	SCH	5/8	2021	113	9.68	31.47	(21.8)
02	0892	00	HUNTERS CHASE SENIOR APTS,	Apts	3	2022	6,632	156.09	173.83	(17.7)
01	1265	04	TINA GOLDEN	RES	5/8	2021	352	7.70	24.88	(17.2)
01	0825	01	DANA CAFFEY	RES	5/8	2019	356	2.79	19.57	(16.8)
04	2461	00	ROCKDALE IND SCHOOL	SCH	4	>10	2,661	0.00	16.63	(16.6)
04	3385	02	DAVID VELA	MH	2	2014	8,859	61.26	77.82	(16.6)
02	2679	01	MANUELA BARKER	RES	5/8	2021	337	5.95	22.34	(16.4)
02	1072	01	OM NILKHANTH NAMAH, LLC	COM	1	2019	2,828	66.78	81.48	(14.7)
01	0285	01	ROCKDALE HISTORICAL SOCIETY	COM	5/8	2021	177	0.06	14.73	(14.7)
04	2800	03	ORIENTAL KITCHEN	COM	5/8	2014	3,298	11.83	25.98	(14.2)
04	3020	01	ZIMMERMAN, MONA	Apts	1.5	2014	2,888	22.35	35.59	(13.2)
05	3820	00	ROCKDALE IND SCHOOL	SCH	3	2022	178	14.84	27.50	(12.7)
04	3394	00	SHADY GROVE RV PARK	RV	2	2014	9,052	96.94	109.60	(12.7)
02	1050	02	LOS ROBLES MHP, LLC	MH	4	2020	4,360	168.28	180.73	(12.5)
05	0485	00	RONALD MONTGOMERY	RES	1	2014	1,327	6.22	17.49	(11.3)
05	1605	02	SUGARFOOT ENTERPRISES TRU	RES	1	2014	1,885	6.07	17.13	(11.1)
05	1180	06	FILOMENA HENDERSON	RES	5/8	2014	846	7.13	18.16	(11.0)
03	0745	98	JUDITH RUBIO HERNANDEZ	RES	5/8	2021	0	0.00	10.88	(10.9)
01	1040	01	TANGEE SELF	RES	5/8	2020	136	0.40	11.23	(10.8)
02	2940	03	ROGER BAGGERLY	RV	1	2014	792	0.00	10.33	(10.3)
02	1775	02	EVETTE MICHELLE WILEY	RES	5/8	2021	126	4.52	14.58	(10.1)
03	2180	00	ROCKDALE LITTLE LEAGUE	MUN	2	2014	1,775	2.38	12.37	(10.0)
05	0020	00	AUSTIN TEXAS FM GROUP	CH	2	2014	374	2.78	12.29	(9.5)
05	0530	05	TERRY BLACKMON	RES	1	2014	1,080	0.15	9.38	(9.2)
03	1330	08	CARLOS ISAOLA	RES	5/8	2021	101	2.40	11.60	(9.2)
05	2195	05	TERESA I CORDON HICHOS	RES	5/8	2021	152	3.01	11.97	(9.0)
01	1515	26	SUSAN YORK	RES	5/8	2021	47	1.43	10.30	(8.9)
04	2425	03	TOWN OAK APARTMENTS	Apts	2	2014	3,671	28.37	37.14	(8.8)
05	3170	01	CLAYTON GOSSETT	RES	5/8	2021	517	19.23	27.83	(8.6)
04	3386	00	THE RANCH	COM	1	2018	526	8.02	16.36	(8.3)
02	2950	03	TEXAS BURGER/SUBWAY	COM	5/8	2021	466	23.96	32.26	(8.3)
01	1696	09	STACY C CLARK	RES	5/8	2020	124	1.78	9.91	(8.1)
05	1225	09	KAYLA DEARY	RES	1	2014	786	3.16	11.31	(8.2)
03	1275	00	ROCKDALE IND SCHOOL	SCH	2	2016	3,683	46.13	54.12	(8.0)
04	2030	01	ARLISS RICHTER	RES	1	2014	601	1.51	8.91	(7.4)
02	1220	01	MUNCHIES #3	COM	5/8	2020	375	12.47	19.91	(7.4)
03	0640	02	DAINA PAIZ	RES	5/8	2021	201	5.57	12.58	(7.0)
02	2681	01	GERALD O'BRIEN	RES	5/8	2021	187	12.13	19.12	(7.0)
05	3665	05	CHARLOTTE ROGERS	RES	5/8	2021	576	25.17	32.05	(6.9)

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Rte No.	Acct No.	Occu No.	Name	Class Code	Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/ M	2021 Kgal/ M	Usage Change 2022-2021 Kgal/M
04	2155	00	SONIC DRIVE IN # 18	COM	5/8	2020	1,087	46.52	53.42	(6.9)
03	2405	02	JULIO GUZMAN	RES	5/8	2021	154	3.42	10.13	(6.7)
05	2210	05	MAKENLEE WORLEY	RES	5/8	2021	79	4.22	10.78	(6.6)
01	0110	01	JYOTSHNA REED	COM	5/8	2021	0	0.00	6.40	(6.4)
05	3270	02	JAMES M ANDREWS III	RES	1	2014	1,315	4.95	11.33	(6.4)
03	1920	02	KAMIE FITZGERALD	RES	1	2021	565	0.00	6.31	(6.3)
04	1355	04	CARLOTA CAMBRON	RES	5/8	2021	56	0.35	6.60	(6.3)
04	3122	00	ROCKDALE FEDERAL CREDIT	IRRIG	1	2014	5,014	49.73	55.96	(6.2)
02	1730	00	NEW HOPE BAPTIST CHURCH	CH	5/8	2020	104	1.24	7.43	(6.2)
03	0395	04	LEONZO M LEPE	RES	5/8	2021	88	1.72	7.95	(6.2)
03	1145	13	REBECCA NINK	RES	5/8	2021	98	1.16	7.25	(6.1)
05	2970	01	DARLA ROSE	RES	5/8	2020	119	2.00	8.07	(6.1)
05	1325	06	ALLISON LOUIS	RES	1	2014	655	3.73	9.77	(6.0)
03	0455	02	ISAIAH LOPEZ	RES	5/8	2014	749	7.56	13.58	(6.0)
05	2965	00	DOROTHY LAWSON	RES	5/8	2021	86	1.44	7.31	(5.9)
02	1150	04	JAVIER F ROBLES	RES	1	2014	866	11.12	16.93	(5.8)
02	1918	01	ELISSA BENFORD	RES	1	2020	78	1.01	6.77	(5.8)
01	0850	06	NORA JAIMES	RES	1	2014	847	1.15	6.95	(5.8)
02	0327	12	BRENDAN NUNN	RES	5/8	2021	125	4.06	9.74	(5.7)
01	1105	16	ERIC B VASQUEZ	RES	5/8	2021	33	1.96	7.58	(5.6)
01	1289	07	ALMA RAMOS	RES	5/8	2021	144	6.83	12.43	(5.6)
05	3220	00	GLEN GOERES	RES	5/8	2014	2,312	24.70	30.14	(5.4)
04	1995	00	RICHARD GREEN	RES	5/8	2021	444	0.00	5.24	(5.2)
01	1745	11	ASHLEY MCBRIDE	RES	5/8	2020	254	8.40	13.66	(5.3)
05	3695	01	KIM PIZANA	RES	1	2014	1,123	15.13	20.20	(5.1)
01	1915	00	CROCKER RECLAMATION	COM	5/8	2021	8	0.45	5.34	(4.9)
02	2235	00	PECAN CHURCH OF CHRIST	CH	5/8	2020	79	1.00	5.91	(4.9)
03	1335	05	LINDA BUTLER	RES	5/8	2021	243	7.97	12.80	(4.8)
05	2085	02	LINDA DUBUISSON	RES	5/8	2014	312	1.61	6.27	(4.7)
05	0105	09	BREANNA BAILEY	RES	5/8	2014	714	1.95	6.58	(4.6)
05	0785	06	BRITTANY VONGONTEN	RES	5/8	2020	281	9.73	14.38	(4.7)
05	2985	00	TAMARA STOCKTON	RES	1	2020	237	8.13	12.73	(4.6)
04	0940	03	STEPHANIE GAGE	RES	5/8	2014	330	2.31	6.83	(4.5)
02	0055	01	ROCKDALE FOOD MART	COM	5/8	2020	81	1.43	5.87	(4.4)
04	0045	03	DEANA EANES	RES	5/8	2021	78	3.33	7.78	(4.5)
05	2910	04	KATHERYN CZUB	RES	1	2014	621	4.96	9.41	(4.5)
02	2740	08	RAUL JR FLORES	RES	5/8	2021	142	5.42	9.83	(4.4)
05	1245	02	FREDA FATHEREE	RES	1	2014	1,448	7.02	11.37	(4.4)
01	1282	05	BOBBY R BURLESON	RES	5/8	2020	142	3.94	8.13	(4.2)
02	0180	07	JAVIER F ROBLES	RES	5/8	2020	298	10.60	14.84	(4.2)
02	0960	05	JAVIER F ROBLES	RES	5/8	2020	252	2.06	6.28	(4.2)
02	2600	00	PETE CASTILLO	RES	1	2015	294	2.18	6.34	(4.2)
02	2705	12	CARMELITA PEREZ	RES	5/8	2021	102	3.15	7.32	(4.2)
05	0715	04	ERIN LITTON	RES	5/8	2021	184	6.32	10.53	(4.2)
04	3185	01	FIRST ASSEMBLY OF GOD CHUR	RES	1	2014	563	3.11	7.20	(4.1)
05	0455	01	DON JAYAMAHA	RES	5/8	2021	194	6.77	10.79	(4.0)
01	0275	02	SERVICING WELDE ACROSS TEX	COM	1	2022	323	9.26	13.33	(4.1)
03	2720	00	JIM EANES	RES	5/8	2021	254	9.60	13.66	(4.1)
02	1575	01	SHANON LYNN TAYLOR	RES	5/8	2020	49	2.09	6.09	(4.0)
05	0040	05	LYNSEY TAYLOR	RES	5/8	2019	381	6.84	10.81	(4.0)
05	0855	00	SUZANNE AMMON	RES	5/8	2014	676	7.60	11.62	(4.0)
04	3250	03	JC APARTMENTS	Apts	1	2020	866	8.55	12.58	(4.0)
01	0224	03	ESTEBAN E VASQUEZ	COM	5/8	2020	548	21.24	25.21	(4.0)
04	2625	01	MEADOW DR APARTMENTS	Apts	2	2014	7,065	57.15	61.04	(3.9)

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3.11 METER SIZING

3.11.1 Undersized Small Meters

Under sizing meters is a concern due to shortened life expectancy of the meter. There are 16, 5/8x3/4-inch meters that the City might want to consider up sizing.

UNDERSIZED SMALL METERS

Rte No.	Acct No.	Occup No.	Name	Class Code	No. Units	Mtr Size	Sug. Mtr Size	Mtr Age	Last Read Kgal	2022 Kgal/M
05	1600	01	DIANA M PERRY	RES	1	5/8	3/4	2014	2,981	31.68
04	0393	00	MURPHY OIL USA INC	COM	1	5/8	3/4	2014	885	29.32
05	3495	06	ERIKA WULFF	RES	1	5/8	3/4	2020	505	29.13
05	3670	00	DR JOHN M WEED III	RES	1	5/8	3/4	2020	628	28.93
05	3795	02	R L BURNS	RES	1	5/8	3/4	2021	514	28.93
05	1415	00	JOHN KING	RES	1	5/8	3/4	2014	2,597	28.03
05	1635	00	FRANK BURROUGH	RES	1	5/8	3/4	2021	563	26.65
03	0687	00	CITY OF ROCKDALE (VFD)	MUN	1	5/8	3/4	2015	1,086	26.13
05	3115	00	JAMES EARLEY	RES	1	5/8	3/4	2014	2,058	25.29
05	3665	05	CHARLOTTE ROGERS	RES	1	5/8	3/4	2021	576	25.17
02	1781	00	SUMUEL PARK	MUN	1	5/8	1	2022	4,591	72.77
04	3391	02	QUALITY INN HPY LLC	COM	1	5/8	1	>10	7,261	51.94
04	2155	00	SONIC DRIVE IN # 18	COM	1	5/8	1	2020	1,087	46.52
05	1000	00	NATALIE HILL	RES	1	5/8	1	2020	770	41.63
04	3005	01	JULIO'S RESTAURANT	COM	1	5/8	1	2015	3,624	40.19
02	2945	00	PARSLEY'S FOOD SERV	COM	1	5/8	1	2021	673	37.38

3.11.2 Cost Impact of Downsizing Meters

Since the City has a meter demand charge as part of its water and sewer rates, downsizing meters is a financial concern. It is estimated that the City could save approximately $105,000 on capital costs by purchasing down sized meters but would lose nearly *$65,000 per year* in reduced minimum bill revenue. The following table summarizes impact of downsizing meters based on current water and sewer rates and meter costs. Irrigation and City accounts are not included in this review.

In order to offset the reduced revenue by downsizing meters, these accounts would have to increase their sales by 483 Kgal each month or approximately 1 Kgal/mo/acct. For many accounts this will probably occur and the City benefits from a reduced meter cost and at the same time were able to recapture the reduced minimum bill revenue.

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FINANCIAL IMPACT OF DOWNSIZING METERS

Mtr Size	Sugg. Size	No. Accts	2022 Kgal/M	Current Min $	Sugg Min $	Diff Min$	Kgal/M Req. Payback	Kgal/M Req. Payback/ Acct
1	5/8	330	6.49	$263,340	$213,840	($49,500)	368	1.12
1	3/4	10	29.67	$7,980	$6,480	($1,500)	11	1.10
1	2	3	110.59	$2,394	$1,944	($450)	3	1.00
1	1	7	47.00	$5,586	$4,536	($1,050)	8	1.14
1.5	5/8	14	5.56	$11,172	$9,072	($2,100)	16	1.14
1.5	1	1	42.60	$798	$648	($150)	1	1.00
2	5/8	31	4.41	$24,738	$20,088	($4,650)	35	1.13
2	3/4	5	33.60	$3,990	$3,240	($750)	6	1.20
2	1	11	43.28	$8,778	$7,128	($1,650)	12	1.09
2	2	6	55.23	$4,788	$3,888	($900)	7	1.17
3	5/8	5	11.27	$3,990	$3,240	($750)	6	1.20
3	3/4	1	29.63	$798	$648	($150)	1	1.00
3	1	1	48.98	$798	$648	($150)	1	1.00
3	2	1	254.32	$798	$648	($150)	1	1.00
3	3	1	352.5	$798	$648	($150)	1	1.00
4	5/8	5	4.76	$3,990	$3,240	($750)	6	1.20
4	2	1	168.28	$798	$648	($150)	1	1.00
Total		**433**		**$345,534**	**$280,584**	**($64,950)**	**483**	

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3.13 WATER AND SEWER RATES

The City currently has a uniform rate water and sewer rate schedule. The commodity charge is fixed at $4.76/Kgal for the first 7 Kgal which covers approximately 75% of all customers. The sewer rates are fixed at $6.44/Kgal. The minimum bill charges are based on meter size for water only, while sewer minimum charges are fixed at $16.50. The following table summarizes the costs and meter size demands. Both the water and sewer rate minimum bill charges lag behind the meter demand charge.

MINIMUM BILL CHARGE BASED ON DEMAND FACTOR OF 5/8-INCH METER

Meter Size	Meter Demand gpm	Demand Factor	TLE MG	Water Min $	Water Rate Factor	Sewer Min $	Sewer Rate Factor
5/8"	20	1.0	1.5	$37.50	1.0	$16.50	1.0
3/4"	30	1.5	2.3	$37.50	1.0	$16.50	1.0
1"	50	2.5	3.8	$50.00	1.3	$16.50	1.5
1.5"	90	4.5	7.5	$81.00	2.2	$16.50	1.0
2"	160	8.0	12.0	$119.00	3.2	$16.50	1.0
3"	350	17.5	75.0	$206.00	5.5	$16.50	1.0
4"	600	30.0	150.0	$331.00	8.8	$16.50	1.0

The following table shows the "estimated" revenue generated by each Class code. The values are estimated since 12-month averages for each account were used to develop the table. Based on the table below it appears that revenue obtained from the minimum bill generates approximately 46% of the total.

ESTIMATED ANNUAL REVENUE BASED ON 12 MONTH AVERAGE USAGE - CLASS CODE

Class Code	No. Accts	2022 Kgal/M /Acct	Min $ Water	Min $ Sewer	Min $ Total	Comod $ Water/Yr	Comod $ Sewer/Yr	Comod $ Total/Yr	Total W&S $
Apts	20	55.02	$27,384	$3,960	$31,344	$91,171	$72,599	$163,770	$195,114
Church	31	2.11	$17,250	$6,138	$23,388	$3,907	$3,790	$7,697	$31,085
Com.	210	9.32	$129,024	$41,580	$170,604	$145,520	$137,677	$283,197	$453,801
EMP	3	3.92	$1,350	$594	$1,944	$707	$807	$1,514	$3,458
Hosp.	3	6.20	$5,850	$594	$6,444	$1,189	$613	$1,802	$8,246
Irrigation	32	16.95	$24,444	$6,336	$30,780	$38,126	$0	$38,126	$68,906
Trailer Pk	2	114.77	$5,400	$396	$5,796	$19,686	$16,602	$36,288	$42,084
City	26	21.41	$30,540	$5,148	$35,688	$45,327	$30,812	$76,139	$111,827
Nursing	1	164.70	$1,428	$198	$1,626	$14,660	$12,442	$27,102	$28,728
Res.	1,834	5.57	$891,228	$363,132	$1,254,360	$623,406	$539,274	$1,162,680	$2,417,040
RV Pk	5	39.82	$4,656	$990	$5,646	$15,351	$16,603	$31,954	$37,600
School	12	14.96	$18,072	$2,376	$20,448	$12,317	$13,801	$26,118	$46,566
Total	**2,179**	6.99	**$1,156,626**	**$431,442**	**$1,588,068**	**$1,011,367**	**$845,020**	**$1,856,387**	**$3,444,455**
% Total $			**33.6%**	**12.5%**	**46.1%**	**29.4%**	**24.5%**	**53.9%**	

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3.14 LARGE METER INSPECTIONS & PHOTOS

In the Rockdale water distribution network, there are 460 accounts served with a 1-inch or larger meter representing about 41% of the metered usage. Although 1-inch meters are not usually considered to be large meters, they are included in this section since 1-inch meters are universally miss-applied and are often a major source of meter over-sizing.

The large meter analysis comprised the following tasks:

- Large Meter Distribution of Usage
- Large Meter Inspections
- Large Meter Sizing Analysis
- Large Meter Maintenance Cost Analysis

For this water audit project all 3-inch and larger meters were inspected in the field for installation problems and sizing considerations. Each site was photographed and a photo database was developed. A summary of results is included in this chapter of the report. A complete large meter inspection report including photographs of large meter sites is included in the Appendix.

3.14.1 Types of Meters in Use

Of the 460 one-inch and larger meters in the analysis, 85% are 1-inch and 1.5-in meters. Multi-jet meters make up the largest category of meter type for all meters in the 1-inch, 1.5-inch sizes.

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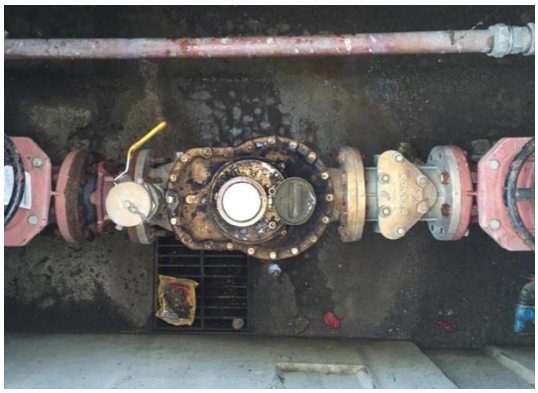
A further 12% of accounts in the large meter category are served with 2-inch meters. The majority of these are multi-jet.

Of the three-inch and larger meter assemblies 8 are served with ultra-sonic (static) meters. A further 7 are served with turbine meters (3 are the high flow side of dual body compound meters). One meter is served by a very old single register compound meter

Ultra sonic meter

Turbine meter



Example of single register compound meter

Example of dual body compound meter

3.14.2 Large Meter Maintenance

In the past, the American Water Works Association has supported the concept that meter sizes should be used to determine the suggested frequency of meter testing. JBS recommends that the annual metered volume of water (utility revenue potential) for each meter is a more direct and effective criterion.

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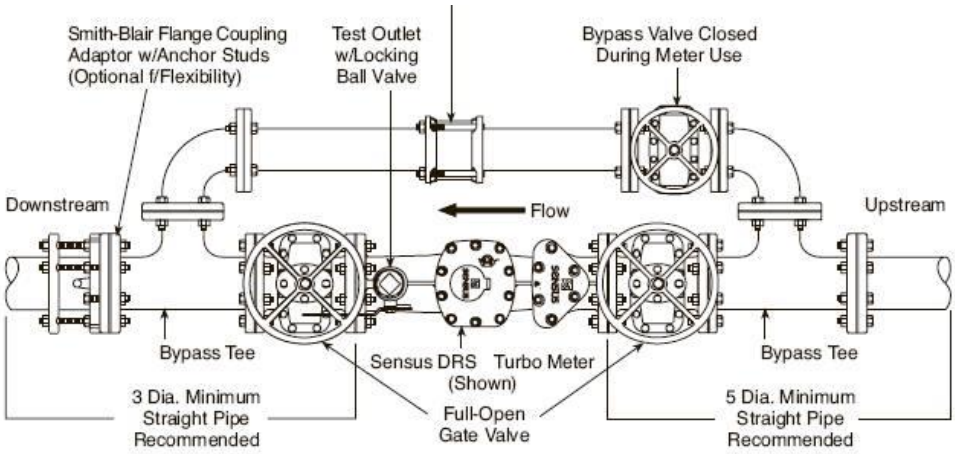
All large meters (and high use customers) should be monitored on a monthly basis. Any large meter account that has a sudden unexplained drop in usage should be tested. A meter is recommended for annual testing if it has the potential for realizing an annual revenue gain greater than the cost of testing based upon 1% assumed meter error. All other accounts should be monitored closely and tested or replaced as needed. Any sudden drop in monthly usage for these large meter accounts should be investigated immediately. The costs for testing are estimated at about $250 per meter (estimated contractor cost). In Rockdale, many large meters have been overlooked for testing and/or replacement, as observed during the Large Meter Inspections.

The first step in testing large meters in-place falls back to the meter installation. Most large meters in the Rockdale system are not set up for in-place testing due to lack of bypass lines and test plugs.



Without a by-pass valve and line any meter maintenance necessitates shutting off the water supply for the time it takes to conduct the service.

Without a strainer, in the case of mechanical meter (turbine meter), damage can be inflicted on the meter rotor by debris entering the assembly from upstream operations (line maintenance)

The following table summarizes 14, two-inch and larger meter accounts that generate at least $10,000 per year in commodity revenue. The combined commodity revenue from these accounts approximates $344,000 per year. Hypothetically, if a 2%-meter error occurred in these meters, the lost revenue would approximate $6,900 per year, versus approximately $4,200 for testing. At 1%-meter error the payback is still worth the testing cost and would still pay back the testing cost in approximately 1.2 years.

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METERS THAT SHOULD BE TESTED ANNUALLY
(2-INCH AND LARGER METERS)

Rte No.	Name	Class Code	No. Units	Mtr Size	2022 Kgal/M	Wnt Kgal/M	Comod $ Water/Yr	Comod $ Sewer/Yr	Comod $ Total/Yr
01	HOUSING AUTHORITY	Apts	60	3	352.55	310.93	$32,784	$24,029	$56,813
04	T-N-T CARWASH	COM	1	2	298.96	262.67	$27,614	$20,299	$47,913
04	CITY OF ROCKDALE	MUN	1	2	221.42	199.20	$20,132	$15,394	$35,526
04	ROCKDALE ESTATES & REHAB	NUR	1	2	164.70	161.00	$14,660	$12,442	$27,102
02	LOS ROBLES MHP, LLC	MH	1	4	168.28	148.23	$15,006	$11,455	$26,461
02	HUNTERS CHASE SENIOR APTS,	Apts	80	3	156.09	142.73	$13,829	$11,030	$24,859
04	CGCB PROPERTIES, LLC	Apts	1	1	120.63	110.60	$10,408	$8,547	$18,955
04	FALLS CAPITAL INC.	COM	1	1	101.80	113.87	$8,592	$8,800	$17,392
02	DAYS INN	COM	1	2	105.46	107.30	$8,945	$8,292	$17,237
04	SHADY GROVE RV PARK	RV	1	2	96.94	111.37	$8,123	$8,607	$16,730
04	CITY OF ROCKDALE	MUN	1	1	109.34	82.33	$9,319	$6,362	$15,681
04	ROCKDALE INN MOTEL	COM	1	2	109.69	74.63	$9,353	$5,767	$15,120
04	GILL'S BUDGET INN	COM	1	2	75.69	93.70	$6,072	$7,241	$13,313
01	ROCKDALE APARTMENTS	Apts	27	2	82.03	56.43	$6,684	$4,361	$11,045

The following table summarizes large meter inspections.

LARGE METER INSPECTIONS - FITTINGS INSTALLED

Fittings Installed	Meter Assy's	% Meter Assy's
Back Flow	7	41.2%
By-Pass	2	11.8%
By-Pass Secure	0	0.0%
Inlet Valve	7	41.2%
Outlet Valve	10	58.8%
Strainer	1	5.9%
Test Plug	0	0.0%
Total Installations	**17**	**100.0%**

Only one large meter installations have a visible strainer installed. Where turbine meter meters are installed, they would have benefitted over the years by having a strainer. We suspect that these meters, age aside, cannot function adequately in their present configuration. The value of a suitable strainer (and well maintained) ahead of the meter (mechanical type) cannot be underestimated as it protects the internal measuring chamber of the meter from possible scale or debris in the flow stream. The strainer requires periodic maintenance to ensure that there is no excessive debris captured that may impact meter performance.

None of the large meters have a test plug installed, often provided with the meter assembly. None, if any, are readily accessible without removal of the meter box and excavation. The lack of accessible test plugs on means that the City is limited in its capability to conduct annual on-site testing of the large meters.

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Only two by-pass installations on the large meters. There may be some that are buried (meter box installations). Where a by-pass line was observed, none had a lock-off mechanism on the by-pass valve. These valves need to be checked to ensure there is no illicit passage of water and then locked off (chained). The consequence of open by-pass valves is that by accident, or design, water is delivered to the user without having been measured and correspondingly billed. All by-pass valves need to be secured by the City, ensuring that if any emergency water needs are supplied, this is only at the Utility's discretion.

Only 7 large meter installations appeared to have a visible and accessible inlet valve. We suspect that in the remaining instances cases, the valve is buried in dirt. The inlet and outlet valves are necessary for on-site large meter maintenance and in-line testing of meters or replacement of meter chambers. In some locations (older meters), the existing valves may be aged and inoperable and may need replacement.

3.14.3 Meter Installation Assessment

SUMMARY – METER INSTALLATION TYPE

	Vault Cover Type					
Installation Type	**Alloy**	**None**	**Plastic**	**Steel**	**Total**	**% Meters Inspected**
Concrete Vault	2	1		1	4	23.5%
Meter Box			12		12	70.6%
Steel Box				1	1	5.9%
Total	**2**	**1**	**12**	**2**	**17**	**100.0%**

Only two of the 3-inch and larger meters are installed in appropriately sized concrete vaults, with excellent quality alloy covers. There are two installations provided with steel covers. The steel covers are very heavy to lift and lack suitable hinges and are hazardous to use.

Of the 12 meters found in a meter box installation, all were found to be too small for the application. Most are in poor condition; warped meter box, badly fitting cover. Most of these are of plastic construction. The meter box approach for these large meters is questionable since it does not readily provide full access to the meter assembly.

The concrete meter vaults represent about 24% of the installations and are mostly found to be in Good to Excellent condition. The one reported with no cover is located at Rockdale Residence & Rehab Ctr (abandoned nursing home).

The following table provides insight into the general condition and adequacy of the large meter vaults and meter boxes.

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LARGE METER INSPECTIONS - VAULT STRUCTURE & CONDITION

	Excellent	Good	Fair	Unsatisfactory	NA	Total
Vault/Box Condition	2	0	1	14		17
%	11.8%	0.0%	5.9%	82.4%	0.0%	100.0%
Cover Condition	2	0	11	3	1	17
%	11.8%	0.0%	64.7%	17.6%	5.9%	100.0%
Serviceability	2	4	2	9		17
%	11.8%	23.5%	11.8%	52.9%	0.0%	100.0%

Only two large meter installations were found to be in excellent (new) or good condition, with a serviceability index around 75% (ease of meter access for maintenance)

The large meter installations in the Fair and Poor categories will require significant maintenance at next service interval. Some installations will need replacement/reconstruction when re-sizing is implemented to expedite annual meter testing of these large meters.

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3.14.4 Summary of Large Meter Inspection Results

Acct #	Name	Meter #	Mtr Age	Last Read Kgal	2022 Kgal/Yr	Actual Mtr No 2022	Current Reading	Conf Mtr Size	Mtr Type	Mtr Mfr	Mtr Model	AMR, AMI	Observed gpm	By-Pass	Strainer	BypPass Secure?	Test Plug	Back Flow	Flow Inlet Valve	Outlet Valves	Vault Type	Vault Cond	Cvr Type	Cvr Cond	Serviceability	Observations
02-0892-00	Hunters Chase	43516053	2015	66324	1,873.0	Correct	06609682.7	3	U-Sonic	Master Meter	Octave	AMR	0.416	Yes	Yes	No	No	No	Yes	Yes	Concrete	Excellent	Alloy	Excellent	Excellent	Partly flooded vault.
02-1050-02	Los Robles MH Park	44516605	2020	43601	2,019.0	Correct	04332949.7	3	U-Sonic	Master Meter	Octave	AMR	2.01	No	No	NA	No	Yes	No	No	Mtr Box	Poor	Plastic	Fair	Good	Plastic MB above ground
01-1630-04	Youth Opportunity Center	43505497	2014	93970	2.0	Correct	None	3	U-Sonic	Master Meter	Octave	No	NA	No	No	NA	No	Yes	No	No	Mtr Box	Poor	Plastic	Fair	Fair	Meter not functioning; buried in dirt.
04-2475-00	Rockdale Hospital	44503765	2019	2718	172.0	Correct	0030258.8	4	U-Sonic	Master Meter	Octave	AMR	0.305	No	No	NA	No	Yes	No	No	Concrete	Poor	Steel	Poor	Fair	Vault partly filled with dirt. Very heavy steel covers: no hinges-hazard to open.
04-2461-00	RISD Rockdale High School	1021030H	>10	26612	0.0	Correct	02661200	4	Turbine	IMC	TWM2001	No	0	No	No	NA	No	Yes	Yes	No	Mtr Box	Poor	Plastic	Fair	Poor	MB filled with dirt & leaves. Broken register on low flow meter.
04-2461-00	RISD Rockdale High School	1021510L	>10	5478	0.0	Correct	None	0.75	M-J	IMC	Unknown															Part of previous meter assy. Broken register.
05-3820.-00	RISD Rockdale Junior High School	211104266	2022	1781	178.0	Correct	000196171	3	U-Sonic	Master Meter	Octave	No	0.17	No	No	NA	No	Yes	No	No	Mtr Box	Poor	Plastic	Fair	Fair	Meter buried in dirt.
03-1486-00	RISD Rockdale Track & Field	33532237	2018	21650	588.0	Correct	02294640	3	U-Sonic	Master Meter	Octave	AMR	2.438	Yes	No	No	No	Yes	Yes	Yes	Concrete	Excellent	Alloy	Excellent	Excellent	Large vault, well drained.
05-2010-00	RISD Rockdale High School	1448189	>10	166390	264.0	Correct	16724700	3	SR Cmp	Sensus	SR Cmp	No	0	No	No	NA	No	No	Yes	No	Steel	Fair	Steel	Fair	Poor	Conference Ctr. Very old SR compound meter. Heavy cover-no hinges-hazard to open.
04-2628-03	CGCG Properties Pecan Ridge Apts	6121658H	>10	15650	19.0	Correct	001566300	4	Turbine	Master Meter	DBC-Hi	AMR	0	No	No	NA	No	No	No	No	Mtr Box	Poor	Plastic	Fair	Fair	Damaged meter box. MB filled with dirt & leaves.
04-2628-03	CGCG Properties Pecan Ridge Apts	8374618	2014	139978	1,448.0	Correct	4062342	1	M-J	Master Meter	DBC-Lo	AMR	0													Part of previous meter assy.
04-3391-02	Quality Inn	3910876	>10	10590	0.0	Correct	001829000	4	Turbine	Master Meter	DBC-Hi	No	0	No	No	NA	No	No	No	No	Mtr Box	Poor	Plastic	Fair	Poor	Leak in meter box. MB filled with dirt & leaves.
04-3391-02	Quality Inn	3910876L	>10	72612	623.0	Correct	xx380820	0.75	M-J	Master Meter	DBC-Lo	No	0													Part of previous meter assy. Scratched lens: regiter unreadable.
02-2935-00	City Yard	101013394	2021	5401	356.0	33532247	00540558.7	3	U-Sonic	Master Meter	Octave	No	0	No	No	NA	No	ir Ga	Yes	No	Mtr Box	Poor	Plastic	Fair	Good	Shallow MB partly filled with dirt. At risk in freezing weather.
02-2925-00	City Yard	253370	>10	NA	0.0	CNV	None	?	Turbine	ARAD	Unknown	No	0	No	No	NA	No	No	No	No	Mtr Box	Poor	Plastic	Fair	Poor	MB filled with dirt. Broken register.
01-1275-00	Housing Authority	33532236	2021	64287	4,231.0	Correct	07085802	3	U-Sonic	Master Meter	Octave	No	0	No	No	NA	No	No	No	No	Mtr Box	Poor	Plastic	Fair	Poor	Customer just completed leak repair after meter.
01-1242-00	City IOOF Cemetery	5366564	2015	4527	11.0	Correct	00462044	3	Turbine	Master Meter	MMT	No	0	No	No	NA	No	Yes	Yes	No	Mtr Box	Poor	Plastic	Poor	Poor	Meter buried in dirt in very small MB. Appears to be seasonal use.
02-0285-00	Rainbow Courts	6913604	>10	3122	56.0	Correct	00327000	4	Turbine	Master Meter	Dialog	AMR	0	No	No	NA	No	No	Yes	No	Mtr Box	Poor	Plastic	Poor	Poor	This is a multi unit customer. Meter buried in dirt in very small MB. Possible leak.
04-0955-03	Rockdale Residence & Rehab Ctr	70277509H	2013	15735	0.0	Correct	None	4	Turbine	Neptune	Turbine	No	0	No	No	NA	No	No	No	No	Concrete	Poor	None	NA	Poor	Inactive. Abandoned nursing home. Meter needs to be pulled. Leak in front of property. Possibly a DB Cmp meter.
04-0391-01	Wal-Mart Stores Texas, Lp	8414033	2014	91068	788.0	CNV	098298550	2/3?	Turbine?	Master Meter	ML	No	0	No	No	NA	No	No	No	No	Mtr Box	Poor	Plastic	Fair	Poor	MB filled with dirt. Could not confirm meter size.

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FINAL REPORT
COMPREHENSIVE WATER DISTRIBUTION & METER MANAGEMENT AUDIT
City of Rockdale, Texas
December 2022
CHAPTER 4
LEAKS & NON REVENUE WATER

JBS Water, Inc.

Chapter 4

ROCKDALE, TEXAS WATER AUDIT & METER MANAGEMENT AUDIT

4. LEAKS & NON REVENUE WATER

4.1 WATER DISTRIBUTION SYSTEM

SUMMARY OF ROCKDALE WATER DISTRIBUTION SYSTEM

	2022
Miles of Main (estimate):	60.4
Types of Main:	
A-C	10%
Cast/Ductile Iron	60%
PVC	30%
No. of Service Connections:	**2,720**
Active Accounts	2,179
Inactive Accounts	541
Types of Service Pipe*:	
Polyethylene	80%
PVC	15%
Copper	5%
Leaks per Year:	
Mains Leaks (thru Oct 2022)	27
Service Leaks, etc.	190
Typical System Pressure:	
Max psi	70
Min psi	60
Avg psi	65

*No data-estimated

The water distribution system is operated on two pressure planes, each dependent on supply via its respective pump station, at Mill Street and Texas Street.

Based on work order data provided, there have been 217 water line leaks in 2022. Of these 27 were main break repairs. Other leaks comprised mostly of service line leaks account for 190 of 2022 work orders.

For the City of Rockdale, the challenge of maintaining a low level of Non Revenue Water loss remains substantial.

The following estimate of total water main pipe installed in the system is based on assessment of data captured in the City's own IAMGIS system. This is a recent implementation for the City and is under development. As yet, the system has not been updated to reflect type of pipe material and pipe diameter installed.

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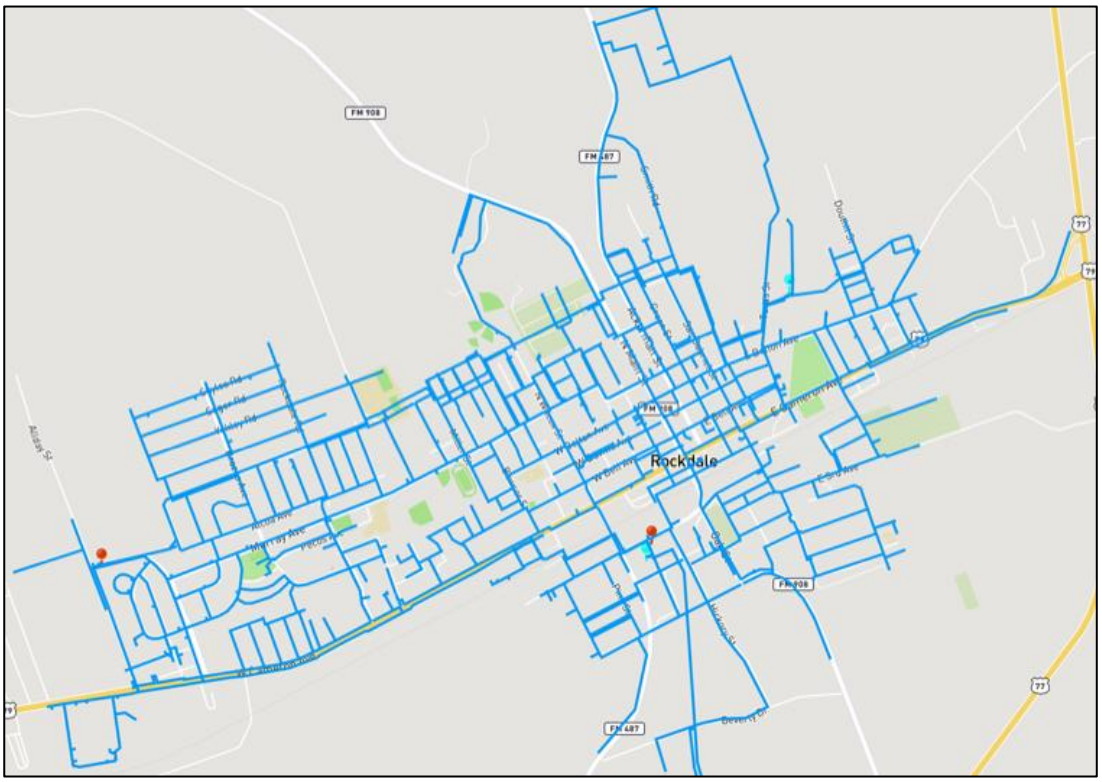
EXTENSION OF WATER MAIN PIPE

Pressure Plane	Sq Miles	Miles of Pipe*
Zone #1 (Allday-High)	0.85	21.06
Zone #2 (Miil St-Low)	1.68	33.45
Total		**54.51**

*Not including well field lines

ROCKDALE: EXISTING DISTRIBUTION SYSTEM



The above map shows the existing distribution system water lines. Owing to the age of the City's pipeline infrastructure, history of leaks and water distribution needs, a major pipeline replacement project is underway (DWSRF Phases 1 & 2).

The following map shows where new pipe sections are being implemented. It is expected that this rehabilitation project will not only improve water distribution efficiency but reduce the number of main breaks in the system.

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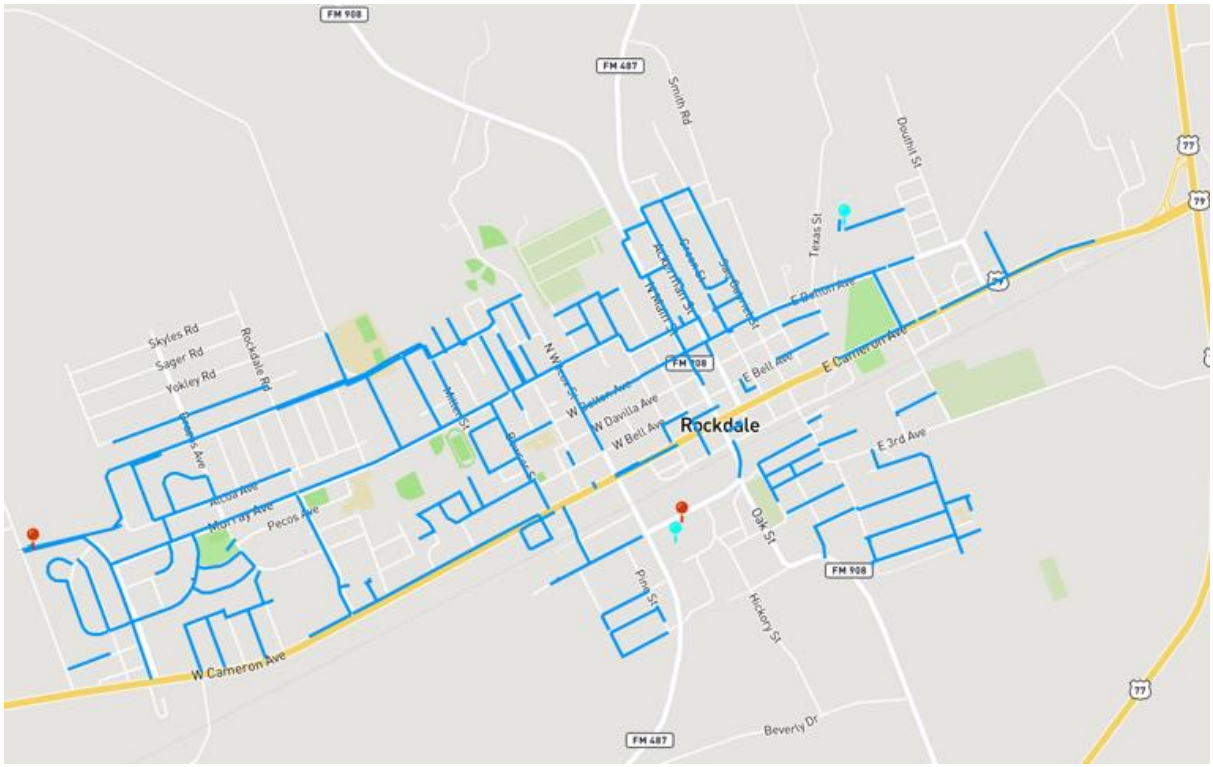
ROCKDALE: PROJECTED NEW WATER LINES



4.2 HISTORY OF LINE BREAKS AND LEAKS

4.2.1 LEAK CATEGORIES

In all water distribution systems, there are two fundamental kinds of leaks:

1. *Known or Evident Leaks* - Those leaks that surface and are visibly leaking from the ground or pavement surface. Occasionally the source of the leak may be a considerable distance away from the area where it is observed.
2. *Unknown or Non-Evident Leaks* (not normally visible) - Leaks that percolate into the ground and leaks that enter other facilities such as storm drains, sewers, stream channels, or old abandoned mains. Such leaks may never surface.

Almost all leaks repaired by the City are visible leaks and are reported by the general public or City personnel. The determination of the actual leak location is accomplished by the utility supervisor or the repair crew assigned to the repair and consists of excavating at the point of surfacing water.

Priority is given to large line breaks for immediate repair.

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Non-visible leaks can only be detected and located with the assistance of an experienced leak detector and appropriate leak locating technology.

Examples of surfacing leaks.

We have reviewed the available City log of water leak repairs from January 2019 to December 2022. Leak repair and other work orders are captured in the City's Billing System application, whereby leaks are assigned a customer account/street address, usually the one closest to the reported leak. The data available is quite detailed but can only be downloaded in a pdf format which is very difficult to parse for analysis, even when using an OCR program to recognize text inside the pdf document.

From this work order data, we obtained the following results for 2022.

WO Category	Leak Type	Qty	% Leak WO
Customer Side leak	CLK	75	23.9%
Curbstop/Meter Leak	CSLK	23	7.3%
Hydrant Leak	FHLK	5	1.6%
Main Leak	MNLK	27	8.6%
No Leak Found	NO LEAK	22	7.0%
Service Leak	SLK	161	51.3%
Valve leak	VLK	1	0.3%
	Total	**314**	**100.0%**

In Rockdale 58% of work orders are service leak related (line or meter box leaks) service leaks. Around 24% of work orders are for customer side leaks (often requiring City assistance for shut offs). Another 9% of leak repair were on water mains. Of course, this category involves the greatest water loss volumes. 47 hydrant leaks and 69 other leak categories, including valve leaks. The remaining work orders were for leaks on valves or hydrants or for locations where no leak was confirmed.

All leaks repaired in the work order data are of the "known leak" category, reported by customers or the Police Dept.

In summary, the majority of leaks the City repairs may have been running for hours or days, in some cases perhaps weeks prior to the call and subsequent repair. This in no way reflects on Public Works, this may be the time it takes for a given leak to become self-evident (at surface). Response times appear to be reasonably prompt and every effort is made to assign a repair on a same day basis. Each leak is assigned to a repair crew for attention, usually on the following priority basis. If the report is of a substantial water loss (i.e. main break) the next available crew is assigned immediately. Most other leaks are put in the "queue" and assigned to a crew in rotating order.

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If necessary, the leak is inspected by the supervisor or a crew chief.

4.2.2 LEAK SURVEY PROGRAM

In August 2020 Rockdale implemented a contract leak survey program for the detection and location of non-evident leaks. This was done in response to the increasing levels of NRW and the history of leak repairs. Leak detection technology and expertise are tools whereby a water system can effectively detect and locate non-evident leaks as well as cost effectively locate those hard-to-locate visible leaks that challenge the best repair crews.

The following tables summarize results of the 2020 leak detection.

Summary of LD Survey 2020	
Main Line Leaks	7
Service Line Leaks	1
Fire Hydrant Leaks	1
Valve Leaks	3
Total	**12**

No assessment of recoverable leakage was provided at the time of detection and repair. The number of leaks reported was lower than expected.

Example of Main Break Located on 8-inch AC Water Line

4.2.3 LEAK REPAIR WORK ORDERS

In Rockdale, visible leaks (among many work order tasks) are called in to City Hall, where the information is logged into the work order entry database provided with the billing system.

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MBER	ACCOUNT NO#	LOCATION	JOB CODE	STAT	STAFF	REQUESTED BY	JOB DATE	COMPLETION DATE	GROUP ID
	COMPLETION	NO LEAK FOUND SEELKE/MATT 01-19-21							
6324	02-0865	307 SANFORD	LEAK	COMP	NA	NITISHA BUTLER	1/07/2021	1/07/2021	NA
	ORDER	TEMP TURN OFF/ON FOR LEAK REPAIR - WATER LINE WAS HIT BY UTILITY COMPANY AND NEEDS WATER OFF FOR REPAIR - ADDED $15 FEE TO ACCT CHARGES							
	COMPLETION	TURNED WATER OFF 01-07-21 JUSTIN							
6325	04-2560	1904 BRAZOS	LEAK	COMP	NA	ROCKDALE HOSPITAL DI	1/08/2021	1/08/2021	NA
	ORDER	WATER LEAK ON CITY SIDE BY FIRE HYDRANT (PER JOSH)							
	COMPLETION	1 3/4" SPLICER AND 1FT OF POLY JUSTIN/JOSH 01-08-20							
6326	05-0785	2208 MURRAY	LEAK	COMP	NA	BRITTANY VONGONTEN	1/08/2021	1/08/2021	NA
	ORDER	LEAK ON CUSTOMER SIDE.							
	COMPLETION	LET CUSTOMER KNOW LEAK IS ON THEIR SIDE. JUSTIN 01-08-21							
6341	01-2040	500 E BELL	LEAK	COMP	NA	TOM NEWTON	1/12/2021	1/12/2021	NA
	ORDER	WATER RUNNING DOWN DRIVE. NEIGHBOR CALLED THIS IN							
	COMPLETION	TURNED WATER OFF AT METER. FAUCET IS BROKE. JUSTIN 01-12-21							
6342	03-0970	333 W DAVILLA	LEAK	COMP	NA	JUAN GARZA	1/12/2021	1/12/2021	NA
	COMPLETION	2FT BLUE POLY, 1 SPLICER, 1 3/4" MALE NUT SEELKE/MATT/JEFF 01-12-21							
6348	01-0470	515 SAN GABRIEL	LEAK	COMP	NA	ELOISA TORRES	1/12/2021	1/12/2021	NA
	ORDER	TEMP TURN OFF - ADDED $15 CHARGE TO ACCOUNT - OWNERS ARE OUT OF STATE AND WILL NOTIFY US WHEN THEY ARE READY FOR WATER TO BE TURNED BACK ON							

• WO Number	• Job Date
• Acct Number	• Completed Date
• Job Code	• Issue Description
• Requested by:	• Details
• Activity & Description (free text)	• Leak Type*

** Items derived by JBS from the Details field.*

The output format of work order data does not lend itself to efficient detailed analysis. Although there is useful data provided in the free text, it was not possible to drill down into the hundreds of work orders. We devoted over 25 hours of time parsing the data provided to be able to accomplish a review of the 2022 data alone.

The use of codes or abbreviations, by the City, for certain data items in the system would facilitate the capture and provide for more accurate data input. This might also avoid the common spelling inconsistencies and nomenclature problems we observed. The work order system requires substantial user input of text in the “Notes” and “Details” fields. Our analysis of the data was made more difficult by the limited reporting capabilities of this package (default report layouts). The City would benefit from the implementation of a purpose built work order system that includes the following information.

• Leak Type*	• Pipe Size*
• Pipe Material*	• Water Used/Lost

Contractor caused leaks may be on mains or service lines and usually occur as a result of other works by third parties, other utilities or even occasionally property owners. These leaks are cause for concern as they would not have normally broken out and reflect on poor operating practices of these third parties. Some of these may get repaired by the contractors and are not fully reported in the work order system.

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The existing work order system does not appear to adequately support on-going tracking procedure in place to log main breaks, service leaks specifically. Or to capture such items as: Leak Type, Pipe Size, Pipe Material or water used for flushing lines after main break repair or estimates of leak size for loss volume assessment. It is hoped that leak repairs will be captured in the IAMGIS system.

Non revenue water use is reported to City Hall in the form of monthly work sheets showing flush locations, dates and water use estimates. Hydrant flushing for operational purposes such as water quality maintenance is “authorized unbilled (metered or unmetered) water use” and should be tallied as such for the monthly non revenue water report. Any hydrant flushing that is a direct consequence of a water leak repair must be considered part of that leak since it would not have been occurred if not for the water leak itself. As such these volumes should be considered with the water loss estimate of the leak itself.

In summary we suggest that to better estimate water losses through repaired, known leaks, the City will need to expand reporting procedures, which in addition to the data currently captured, should include:

1. Damage assessment (main breaks).
2. Estimate of water loss/use for all leaks.
3. Estimate of flushing operations (and other authorized water use).
4. Implementation of a "pin" map as a visual method for tracking line breaks and leaks and other maintenance history.
5. Integration of work order data with the City’s IAMGIS system to facilitate computer generated leak history maps and geographic analysis by subdivision, pipe material, etc.

The capability to effectively analyze leak repair history is increasingly important as it provides the administration with insight into operations and trends and to rely less on experienced hunches.

With improvements to the existing work order information, all leak repairs (and related tasks) should be fully analyzed annually. This information is invaluable for the on-going determination of trends, patterns of failure and areas of high leak incidence, as well as providing data for operational improvements. It will also provide improved data for the annual TWDB water loss report.

4.2.4 ANALYSIS OF LEAK HISTORY

In this water audit our goal has been to assess how much of the City’s Non Revenue Water-NRW (Unaccounted for water) can be attributed to meter related factors (apparent losses) and how much may be due to distribution system leakage (real losses). In particular, what part of the NRW may be due to Non-Evident Leaks. The available work order data provides only limited information as to the type of leaks repaired, limiting the scope of the analysis.

The following table provides the most recent data from the work order information provided (annual pdf reports).

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BREAKDOWN OF LEAKS REPAIRED 2019-2022

Month	Main Breaks	Other Leaks*	All Leaks	Annual Total	Precip (in)
Jan-19		19	19		4.81
Feb-19		16	16		2.12
Mar-19	1	30	31		1.25
Apr-19		7	7		5.55
May-19		32	32		5.83
Jun-19		19	19		4.03
Jul-19		26	26		0.04
Aug-19	1	25	26		1.68
Sep-19	2	39	41		2.21
Oct-19	3	33	36		3.06
Nov-19	1	14	15		1.27
Dec-19	2	17	19	287	0.56
Jan-20		24	24	292	2.49
Feb-20	1	11	12	288	1.57
Mar-20		19	19	276	2.50
Apr-20	1	8	9	278	3.86
May-20		19	19	265	2.75
Jun-20		22	22	268	1.60
Jul-20	3	26	29	271	2.61
Aug-20		21	21	266	0.71
Sep-20		26	26	251	3.77
Oct-20	1	21	22	237	0.37
Nov-20	2	30	32	254	0.96
Dec-20	2	16	18	253	3.62
Jan-21	1	29	30	259	3.72
Feb-21	3	88	91	338	1.11
Mar-21	1	41	42	361	1.73
Apr-21		23	23	375	3.06
May-21		19	19	375	6.31
Jun-21		10	10	363	2.91
Jul-21		31	31	365	2.91
Aug-21		23	23	367	4.01
Sep-21	4	23	27	368	2.19
Oct-21		21	21	367	0.24
Nov-21		18	18	353	4.22
Dec-21	1	16	17	352	1.74
Jan-22		1	1	323	1.42
Feb-22	1	0	1	233	0.42
Mar-22		17	17	208	4.12
Apr-22		20	20	205	3.56
May-22	1	22	23	209	2.65
Jun-22	2	25	27	226	2.56
Jul-22	3	34	37	232	0.17
Aug-22	8	55	63	272	0.01
Sep-22		31	31	276	4.45
Oct-22		28	28	283	2.54
Nov-22					1.61
Dec-22					5.17

* WO report includes main breaks that were not itemized in the City's Main Break list.

The following chart presents the monthly leak work order totals for 2019 to 2022. Each month the actual numbers of leaks vary substantially depending on incidence rates, seasonal changes and the number of non leak incidences reported in the data. In Rockdale leak frequency increases during the summer months, with the exception

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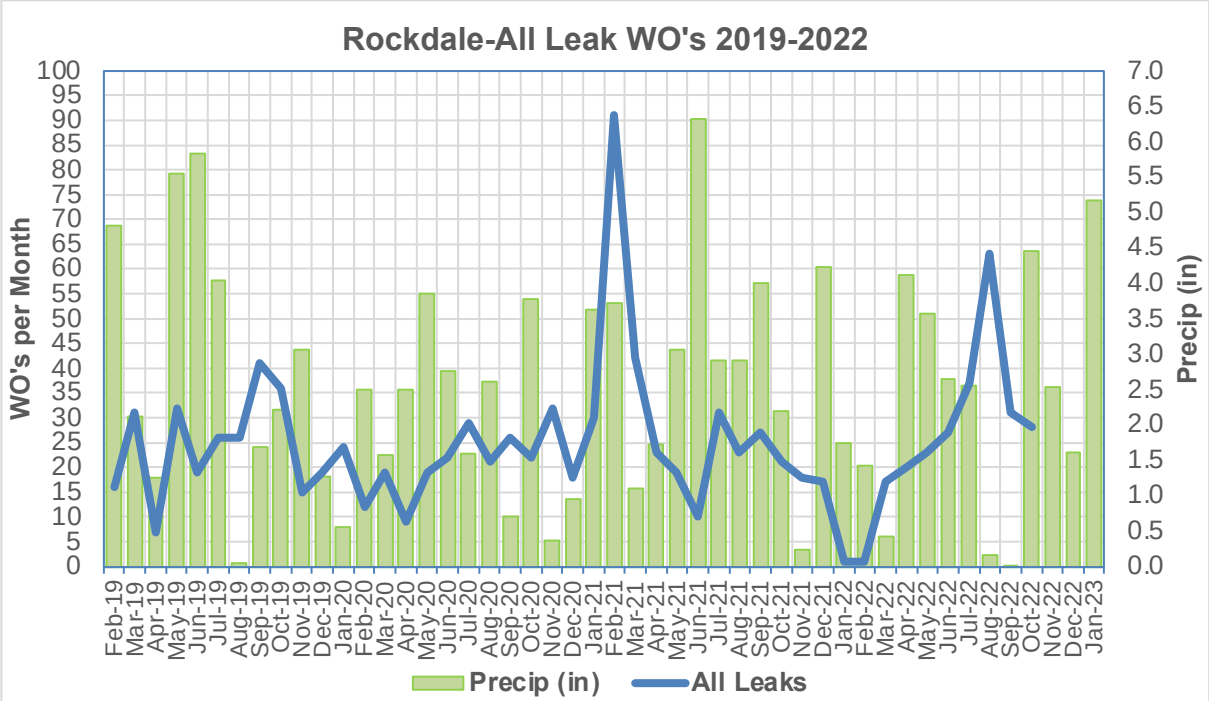
of the impact of the February 2021 winter storm. This is mostly attributable to expansion and contraction of soils due to increasing ambient temperature.



Main breaks are of short duration, but of high volumes of loss and are of concern especially where age and pipe condition factors contribute to these.

Fire hydrant and valve leaks may or may not contribute to severe levels of loss depending on the condition of the hydrant. Again, there is no data available concerning the severity of the leak in the work order data.

Other types of leaks include meter and curb stop leaks and customer side leaks. Usually these leaks do not require significant excavation and are relatively small in terms of volume of leakage.

When reviewing the City's Non Revenue Water (unaccounted for water loss) the estimates of water loss from the distribution system (real losses due to leaks) should be considered separately from the Public Works' metered or unmetered uses. Water use such as the hydrant flushing program is in fact part of the system's authorized metered (unbilled) water use.

Water leaks must be considered endemic to the system and they will continue to be an ongoing part of the Rockdale distribution system, especially in the older parts of the network and where soil movement impacts the pipe. Daily, both large and small leaks occur which are repaired as soon as possible with the City's own resources.

The line breaks often produce very substantial flows, although they are usually limited in duration, some may have run for some time before surfacing. Additionally,

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on 6” and 8” mains, during the repair process hydrant flushing, may be required to reduce line pressure. This requirement is usually determined by the lack of operable main line valves in the immediate vicinity of the leak. Almost all main leaks are repaired under pressure to avoid lengthy shut downs and loss of service.

4.2.5 ASSESSMENT OF WATER LOSS DUE TO LEAKS (REAL LOSSES)

The work order system allows for the capture of estimated volumes of water loss due to repaired leaks. This information along with volumes used in hydrant flushing for different operational purposes is submitted to City Hall on a monthly basis. Some hydrant flushing is metered and therefore the volumes attributed are considered reasonably accurate. However, the estimates of “unmetered water” are very approximate in the work order data and sometimes appear to be excessive or very low. We did not validate reported volumes. In addition, the work order data does not provide an estimate for how long a period the leak ran.

The process of estimating leak loss can be as simple as deriving estimates from Greeley’s formula using tabular data as shown below or using a drip chart (small meter box leaks). These estimates of water loss are indeed approximate, based as they are on flow rate tables for different orifice sizes, pressure and duration. We know through experience that it is easy to assess high volumes with these calculations, but with due care reasonable assessments can be achieved at time of repair.

The following sample chart plots flow rates for an ideal circular orifice, it cannot account for the many variables observed in the field environment (including orifice dimensions, pipe wall thickness, pressure at leak, etc.). In addition, dimensions taken after exposure of the pipe and repair of the leak usually are greater than before. Therefore, we recommend using this approach with caution and by use of field trials for verification.

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WATER LOSS CHART FOR LEAKAGE ESTIMATION

GREELEY'S FORMULA — $Q\ (gpm) = 30.394 \times A \times \sqrt{P}$ — **FOR CIRCULAR ORIFICES**

HEAD		OUTLET DIAMETER IN INCHES										
psi	*feet*	*1/16"*	*1/8"*	*3/16"*	*1/4"*	*3/8"*	*1/2"*	*5/8"*	*3/4"*	*7/8"*	*1"*	*1 1/8"*
10	23.1	0.29	1.18	2.65	4.72	7.37	18.86	29.47	42.44	57.77	75.45	95.49
15	34.6	0.36	1.44	3.25	5.78	9.02	23.10	36.10	51.98	70.75	92.41	116.95
20	46.1	0.42	1.67	3.75	6.67	10.42	26.68	41.68	60.02	81.69	106.70	135.04
25	57.7	0.47	1.86	4.19	7.46	11.65	29.82	46.60	67.10	91.34	119.30	150.98
30	69.2	0.51	2.04	4.59	8.17	12.76	32.67	51.05	73.51	100.05	130.68	165.39
35	80.7	0.55	2.21	4.96	8.82	13.78	35.29	55.14	79.40	108.07	141.15	178.65
40	92.3	0.59	2.36	5.31	9.43	14.74	37.72	58.94	84.88	115.53	150.90	190.98
45	103.8	0.63	2.50	5.63	10.00	15.63	40.01	62.52	90.03	122.54	160.05	202.57
50	115.3	0.66	2.64	5.93	10.54	16.48	42.18	65.90	94.90	129.17	168.71	213.52
55	126.9	0.69	2.76	6.22	11.06	17.28	44.24	69.12	99.53	135.47	176.94	223.94
60	138.4	0.72	2.89	6.50	11.55	18.05	46.20	72.19	103.96	141.50	184.81	233.90
65	149.9	0.75	3.01	6.76	12.02	18.78	48.09	75.14	108.20	147.27	192.36	243.45
70	161.5	0.78	3.12	7.02	12.48	19.49	49.90	77.98	112.29	152.83	199.62	252.64
75	173.0	0.81	3.23	7.26	12.91	20.18	51.66	80.71	116.23	158.20	206.63	261.51
80	184.5	0.83	3.33	7.50	13.34	20.84	53.35	83.36	120.04	163.39	213.40	270.09
85	196.1	0.86	3.44	7.73	13.75	21.48	54.99	85.93	123.73	168.41	219.97	278.40
90	207.6	0.88	3.54	7.96	14.15	22.10	56.59	88.42	127.32	173.30	226.35	286.47
95	219.1	0.91	3.63	8.18	14.53	22.71	58.14	90.84	130.81	178.05	232.55	294.32
100	230.7	0.93	3.73	8.39	14.91	23.30	59.65	93.20	134.21	182.67	238.59	301.97

Water line breaks can produce very substantial flows, especially in Asbestos-Cement (AC) mains. Although they are usually limited in duration, some may have run for some time before surfacing. They are most often repaired under system pressure by use of pipe clamps. Occasionally during the repair process additional flushing may be required to reduce line pressure. This requirement is usually determined by high pressure and the lack of operable main line valves in the immediate vicinity of the leak. Almost all main leaks are repaired under pressure to avoid shut downs and loss of service.

Alternative resources for calculating water lost through distribution system leaks can be found online.

For example, the Missouri Rural Water Association provides an excellent calculator at: http://moruralwater.org/water-tools/

We recommend that any calculator be initially crosschecked on site so that Rockdale Utilities discovers the confidence level attributable to the method. Often calculators, being theoretical and dependent on field measurements, can over-estimate the actual loss.

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Naturally rates of leakage vary greatly, after the fact it is impossible to reliably estimate the volume of loss. By using approximations applied in previous studies we can establish probable volumes for most leak types. For example, we estimate loss from known service leaks to average 3,000-4,000 gallons per day for up to 15 days as these leaks often do not become apparent for some time. This allows for small leaks that may run for several weeks and even months, prior to repair, to large leaks that are addressed within hours or a few days.

4.2.6 CAUSES OF LEAKS

In most water distribution systems leaks vary from slow running service line, curb stop and meter leaks, to corrosion holes or cracks in small diameter mains or blown out taps, or to large main breaks on large diameter lines. The causes of the reported leaks can vary greatly, but the most significant include:

- Soil movement (soil temperature or other causes)
- Load fractures
- Failure of old cast iron, PVC and AC pipe
- Polybutylene service lines
- Failure of pipe fittings
- Contractor caused leaks

Unfortunately, there is not sufficient information available in the work order data to evaluate this aspect in detail to obtain any detailed insight.

Many service leaks are at fittings. However, the majority of service leaks occur on the pipe itself, mostly on plastic tubing. Many of these leaks appear to be the consequence of the pipe pulling out of fittings. This could be a result of poorly mounted fittings, soil movement or effects of significant pressure transients (or a combination of these).

There is a considerable amount of aged asbestos-cement and cast iron pipe in the system. We expect that the severe main breaks encountered in the system are most frequently on these pipes. These, as well as many service line leaks, usually start out as small and may run for some time before they surface.

Contractor or customer-caused leaks are always a cause for concern. Occasionally, these leaks may have gone unreported, as they may have been repaired by the contractor immediately. The work order data may show this type of leak in the comments field, but otherwise there is no report of leaks caused by third parties. It is a category of leak that is avoidable through continued improvement in the coordination of projects and excavations by other utilities, City departments and contractors.

The following section deals with the distribution of leaks throughout the Rockdale service area.

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4.2.7 DISTRIBUTION OF LEAKS IN THE SYSTEM

Using a city street map and the work order database, we were able to determine the streets with most significant reported leak incidence.

The following table summarizes the significant leak repair reports by street for the January 2019 to December 2022 period.

STREETS WITH GREATEST INCIDENCE OF LEAKS 2019-22

Rank	Street	WO's
1	W CAMERON/W HWY 79	58
2	E CAMERON	45
3	ACKERMAN	43
4	ALCOA	29
5	N MAIN	29
6	N MAIN IOOF	29
7	W BELTON	28
8	MURRAY	27
9	YOKLEY	26
10	HIGHLAND	25
11	SAGER	24
12	W BELL	24
13	RICE	20
14	GREEN	19
15	MILL ST	18
16	SAN GABRIEL	18
17	BRAZOS	17
18	BURLESON	17
19	VOGEL	16
20	SCARBROUGH	15
21	E 6TH ST	14
22	O'KELLEY	14
23	N WILCOX	13
24	W DAVILLA	13
25	E BELTON	12

The following map shows the concentration of leak work orders in Rockdale. Between 2019 and 2022 there were over 1,140 reports. The situation is expected to improve with completion of the water mains replacement project. Clearly appreciated is the high concentration of leak repairs in the old core of the city and the NW residential sector in the high pressure zone.

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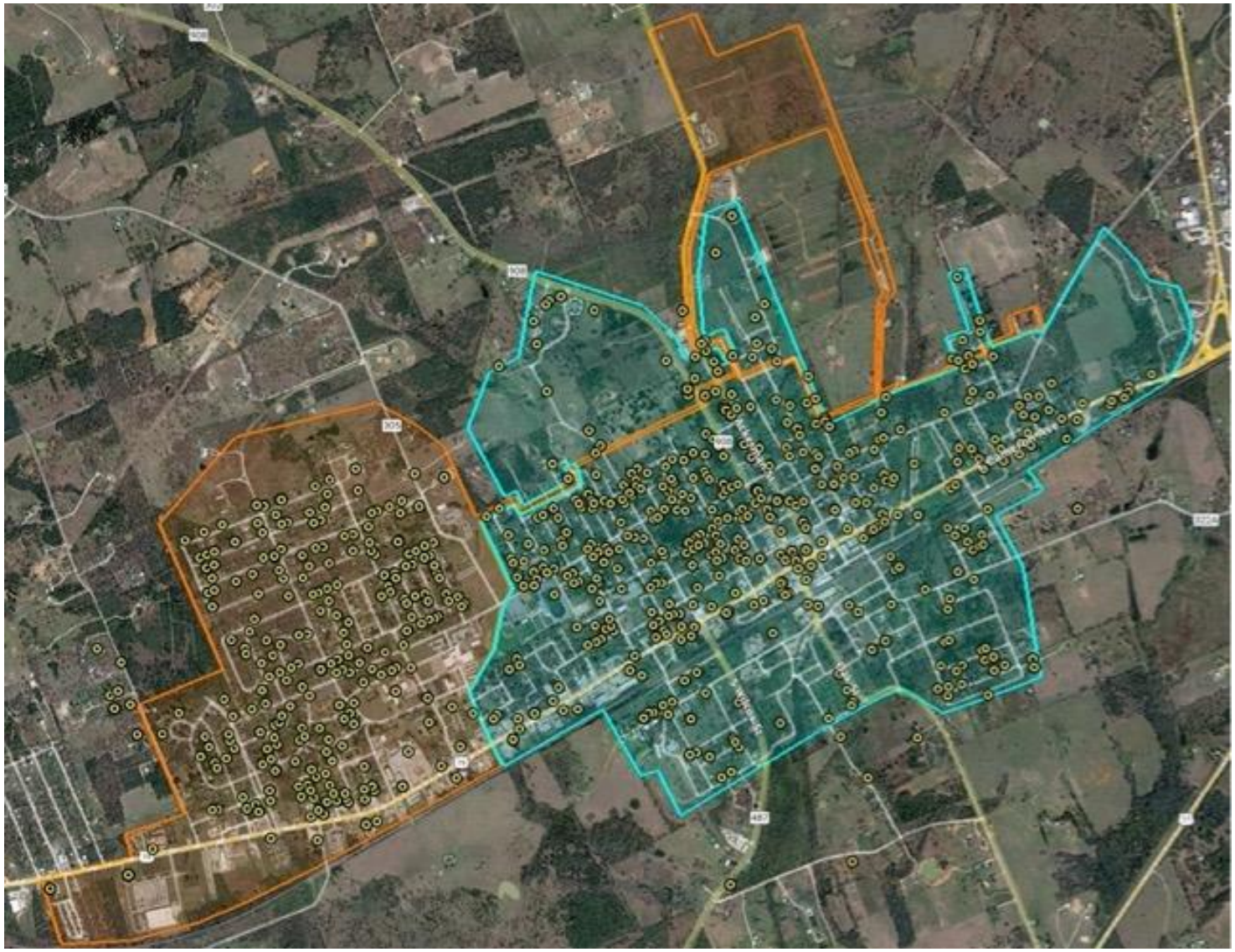
GEOGRAPHIC DISTRIBUTION OF LEAK REPAIRS IN ROCKDALE 2019-2022



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DISTRIBUTION OF LEAK REPAIRS IN ROCKDALE HIGH PRESSURE ZONE 2019-2022

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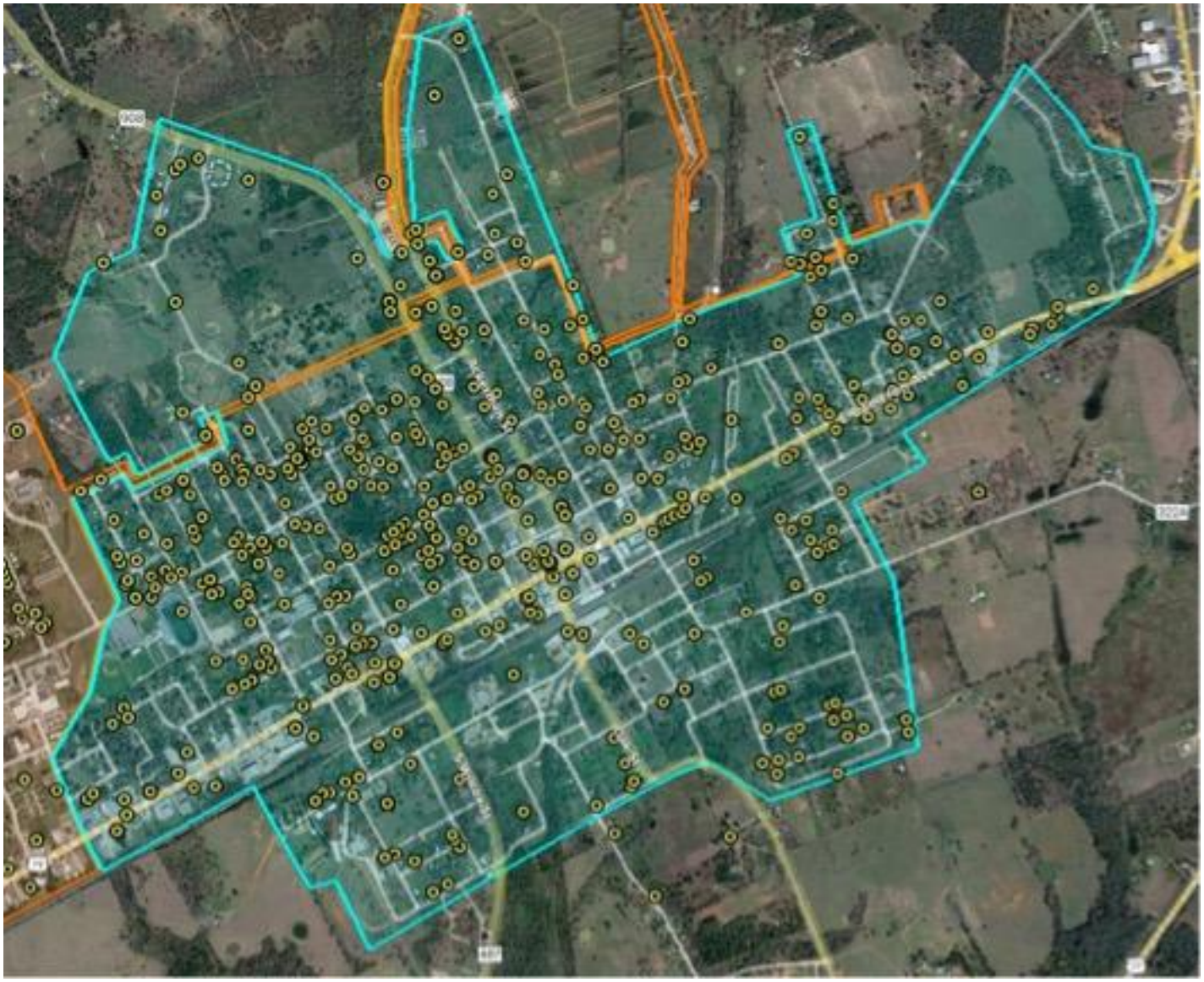
DISTRIBUTION OF LEAK REPAIRS IN ROCKDALE LOW PRESSURE ZONE 2019-2022



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4.3 COST OF LOST WATER THROUGH LEAKS

Based on the review of water production for the twelve months ending November 2022, the base cost (estimated at $0.54/1,000 gallons) to produce 25.9 million gallons of water (unadjusted volume) was about $14,000 annually. The base cost is obtained from the energy and chemical costs to produce water and raw water cost. Because the amount of water pumped (or lost) through leaks does not directly affect the City's cost of labor, that is considered a fixed cost for this analysis and is excluded from the water cost calculation. This is the cost used to establish the cost of physical leakage (real losses) to the City.

4.4 ALLOWABLE LEAKAGE & UARL

In all water systems consideration must be made for allowable (or unavoidable) leakage in the distribution network. This is defined as that quantity of water inevitably lost from a well-maintained water system through:

a) The known or visible leaks and breaks currently repaired by the City;
b) The non-visible and undetectable small leaks which are not considered cost-effective to locate and repair;

Item a) has been assessed based on the leak history data, as follows:

Leak Type	2022 Leaks	Est. Loss/ Leak (gpm/Leak)	Avg. No. Days/ Leak	Total Avg. Loss (gpm)	Total Loss (GPY)	Gallons Lost/ Mile/Yr	Gallons Lost/ Connection/Yr
F.H. Leak	5	2	30	0.8	432,000	7,152	198.4
Main Line Break	27	30	1	2.2	1,166,400	19,311	535.8
Service Line Leak	161	3	20	26.5	13,910,400	230,305	6,389.7
Meter Leak	23	0.5	30	0.9	496,800	8,225	228.2
Other Leaks	1	2	60	0.3	172,800	2,861	79.4
Totals	**217**			**30.8**	**16,178,400**	**267,854**	**7,431.5**

The above assessment is based on approximations of typical leak loss observed in similar water systems. It reflects the probable impact of the visible leaks that the City of Rockdale currently repairs on an annual basis. The above data is for reference purposes and is not applied to the minimum night flow analysis, but it is applied to the overall NRW assessment.

To establish an estimate of unavoidable leakage in a system due to small, undetectable leaks, Item b), consideration should be given to the age, size, and type of pipe and joints, soil conditions, number of valves, hydrants, and service connections as well as system working pressures. Generally, the amount of this allowable leakage will increase with age, the density of connections and system pressure.

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Using the AWWA format to calculate allowable leakage or the "Unavoidable Annual Real Losses" (UARL) we obtained a value of 16.01 MGY (7.2% of annualized production). This indicator does not appear to make allowances for pipe age, only average operating pressure and miles of pipe.

4.5 OTHER SOURCES OF WATER LOSS

Other sources of physical water loss in the distribution system that are ususally considered include:

Source of Loss	Description	MGY
• Leakage in Storage Tanks	None reported	0
• Storage Tank Overflow	None reported	0
• Evaporation from Storage Tanks	All storage tanks covered; no estimates available	0
Total		**0**

There is no specific data reported in the work order data for leakage in storage tanks. All ground storage tanks are in good condition and of recent construction. There is no visible leakage at the elevated storage tanks, however there may be occasional overflow incidents, but no information was available at this time.

4.6 NON-REVENUE WATER USE

In the United States, Non-Revenue Water (NRW) has historically been defined as that water legitimately distributed into the system for non-revenue generating purposes. This may include sewer flushing, hydrant or line flushing, firefighting or training purposes.

In the more recent European definition, currently adopted by the AWWA, it has come to mean the same as the commonly used U.S. term, "unaccounted for water". That definition includes water use that is unbilled due to metering errors or deficiencies. It is our opinion that this second approach tends to mask "commercial" losses that are inherent to water systems with a majority of un-metered or inadequately metered customers as are predominant in many overseas water systems.

Using the U.S. definition for the purposes of this study, the major components of NRW use may include:

- Construction Use (where un-metered)
- Fire Hydrant Use (Fire Dept.)
- Line Flushing (leak repairs)
- Line Flushing (maintenance & water quality)
- Sewer Jetting/Vactor Trucks
- Parks & Gardens (where un-metered)
- Pressure Tests or Water Quality Problems
- Other Un-metered Authorized Use

Currently in Rockdale much of this information is currently being collected on a monthly basis by the Water Department and submitted on work sheets to City Hall

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(Fire Hydrant Flushing Records). To our knowledge all public parks and cemetery water use is metered thereby eliminating what may have previously been another of lost water. However, as all City accounts are metered but not billed, this usage is considered Metered Unbilled Water. Water use (flushing) for water quality purposes is significant when undertaken for maintaining levels of chlorine residual at specific points in the system and needs to be accurately assessed.

It should be noted that water supplied to the City's own metered accounts is unbilled and therefore considered NRW in the new definition.

4.6.1 FIRE HYDRANT USE

The City of Rockdale currently has an estimated 600 fire hydrants that are flushed periodically due to dead end mains, low points, etc. Most of these are on a flushing schedule required to maintain water quality in the vicinity. The monthly totals of fire hydrants flushed are listed below. Occasionally, due to construction and hydrants that are not accessible due to cars being in the way, the totals may vary.

SUMMARY OF HYDRANT FLUSHING RECORDS

Mo/Yr	Total Flushing	Annual Flushing Gallons	Mo/Yr	Total Flushing	Annual Flushing Gallons
Jan-20	146,250		Jun-21	436,750	5,083,750
Feb-20	343,750		Jul-21	306,750	5,073,000
Mar-20	772,750		Aug-21	307,500	5,046,250
Apr-20	337,500		Sep-21	892,250	5,130,250
May-20	328,750		Oct-21	318,750	5,077,750
Jun-20	344,750		Nov-21	199,000	4,790,000
Jul-20	317,500		Dec-21	187,500	4,455,000
Aug-20	334,250		Jan-22	377,750	4,270,250
Sep-20	808,250		Feb-22	312,250	4,582,500
Oct-20	371,250		Mar-22	950,750	4,988,750
Nov-20	486,750		Apr-22	369,000	4,986,000
Dec-20	522,500	5,114,250	May-22	337,250	4,995,500
Jan-21	562,500	5,530,500	Jun-22	342,500	4,901,250
Feb-21	0	5,186,750	Jul-22	316,250	4,910,750
Mar-21	544,500	4,958,500	Aug-22	328,750	4,932,000
Apr-21	371,750	4,992,750	Sep-22	922,250	4,962,000
May-21	327,750	4,991,750	Oct-22	335,000	4,978,250

The volumes reported are estimates and likely need improvement for accuracy.

Fire hydrant flows may also be utilized for emergency fire protection, training or hydrant flow testing. Actual emergency usage may indeed be infrequent, but nonetheless the City should coordinate with the local Fire Department to accurately

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and completely record and track the incidents and volumes along with other sources of NRW.

> *Fire mains will provide 5,000 GPM. Required fire flow is 4,500 GPM. Each hydrant will provide 1,500 GPM. 3 hydrants have to be in proximity to the building, the location to be decided by the Fire Chief (for operational reasons.)*
>
> *Source: FireHydrant.org*

In the absence of reliable data, the above information illustrates the substantial volumes of water used that may go unrecorded and contribute to non revenue water use in the Rockdale water system.

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4.7 DISTRIBUTION SYSTEM ZONES

As part of the plan to conduct minimum night flow measurements on a zone basis, we anticipated utilizing the system's existing pressure zones. In many systems, the natural boundaries and the distribution system's configuration and valving allow for further subdivision in order to reduce the large zones into smaller sections or sub districts. The breakdown of the system into manageable, lower volume districts, allows for a more detailed evaluation of water loss, based on actual water demand during a defined, low use period. The essential components of this evaluation are:

1. Distribution zones, with clearly defined boundaries, that are easy to isolate.
2. Analysis of water consumption by zone.
3. Measurement of minimum night flows to each zone.
4. Assessment of additional leakage potential by zone.

The City of Rockdale essentially operates the water system as two adjacent and separate pressure planes (PP) based on supply sources as well as distribution needs.

It was intended that the minimum night flow test be conducted using the existing pressure zones. Public Works personnel undertook the preparation for this activity and verified the existence and operating condition of specific isolation valves (IV) and pressure regulating valves (PRV) prior to undertaking the test.

DISTRIBUTION SYSTEM BOUNDARIES

Sector	Zones	Location	Tanks in Sector
1	Allday Pressure Plane 1031 West (combined with PP 971)	Rockdale, west of Childress & Bushdale and FM 487 look to Industrial Sector	Allday EST & Texas GST
2	Mill Street Pressure Plane	Central & East Rockdale	Mill St EST & GST

In order to maintain the distribution network's balance, PRV's that separate pressure planes were not closed. Consequently, some flows may have occurred between pressure planes.

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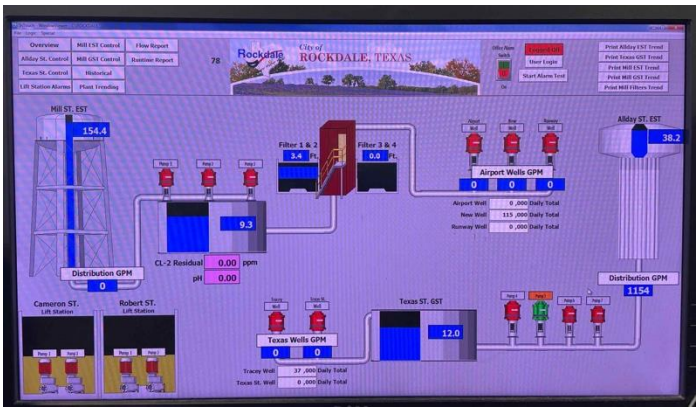
4.8 MINIMUM NIGHT FLOWS

Measuring the nighttime flow rate can be a reliable way to gain some tangible insight into the underground leakage potential in a water distribution system. Between midnight and 4:00 a.m., domestic water demand usually declines to an overnight minimum and system pressures are usually at their highest levels and elevated storage tanks fill.

By monitoring supply at the corresponding elevated storage tanks during a night test period it is possible to assess what the level of overall minimum night flow (MNF) is for the distribution system.



The night flow test in Rockdale was conducted in the early morning of November 16, 2022. The system's elevated storage tank levels were monitored constantly throughout the test period on the Water Plant's control room display (SCADA).

In addition, large users' meters were read by City staff.

The following table summarizes the results of this test.

MINIMUM NIGHT FLOW TEST RESULTS (NOVEMBER 15-16 2022

Zones	Sq Miles	gpm	Accts	gpm/Acct	Miles	gpm/mile
Zone #1 (Allday-High Pressure)	0.85	193.5	892	0.217	21.06	9.2
Zone #2 (Mill St-Low Pressure)	1.68	135.3	1,287	0.105	33.45	4.0
Total		**328.8**	**2,179**	**0.151**	**54.51**	**13.2**

Typical minimum flows to the system were about 329 gallons per minute. The minimum flow represents the system demand when most of the city is asleep, businesses are closed. The data leads to two significant observations:

1. The Allday Zone has less pipe and service connections, but used more water on the night of the test.
2. It is likely that the desired zone isolation was not achieved, but that alone does not account for the wide difference.

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4.8.1 RECORDED NIGHTTIME WATER USE

Potential large volume nighttime users were noted and their meters read before and after the test. Of the 15 meters selected as potential high night users to be read at this time, three were damaged so that readings could not be taken. On the night of the minimum night flow test, the following meters were read. A summary of the accounts and the readings obtained is provided in the following table.

NIGHTTIME USAGE OF METERS READ FOR TEST

#	Acct #	Name	Meter Size	Meter #	Time Diff (Mins)	Gallons	gpm
1	02-0892-00	HUNTERS CHASE	3"	43516053	118	98.00	0.83
2	02-1050-02	LOS ROBLES MH PARK	4"	44516605	120	241.4	2.01
3	01-1630-04	YOUTH OPPORTUNITY CENTER	3"	43505497			na*
4	04-2475-00	ROCKDALE HOSPITAL	4"	44503765	119	4	0.03
5.1	04-2461-00	RISD Rockdale High School	4"	1021030H			na*
5.2		RISD Rockdale High School	3/4"				na*
6	05-3820.-00	RISD Rockdale Junior High School	3"	211104266	121	17	0.14
7	03-1486-00	RISD Rockdale Track & Field	3"	33532237			0
8	05-2010-00	RISD Rockdale High School	3"	1448189	119	0	0.00
9.1	04-2628-03	CGCG PROPERTIES PECAN RIDGE APTS	4"	6121658H	119	0	0.00
9.2		CGCG PROPERTIES PECAN RIDGE APTS	1"		119	10	0.084
10.1	04-3391-02	QUALITY INN	4”	3910876	119	0	0.00
10.2		QUALITY INN	3/4"		119	100	0.84
11	02-2935-00	CITY YARD	3"	101013394			0
12	02-2925-00	CITY YARD	3"	253370			0
13	01-1275-00	HOUSING AUTHORITY	3"	33532236	104	2,604	25.0
14	01-1242-00	CITY IOOF CEMETERY	3"	5366564			0
15	02-0285-00	RAINBOW COURTS	4"	6913604			na
				Total Observed Use:			**28.94**

*No reading: damaged meter registers

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4.8.3 MINIMUM NIGHT FLOW ASSESSMENT

The following table summarizes the assessment of nighttime flows to the system, based on the drawdown data and the meter readings taken:

NIGHT FLOW SUMMARY

Category	Units	
Residential Units (1,835 Accts)	1,835	
Irrigation Accounts (32 Accts)	32	
Apartment Units (19 Accts)	570	
Commercial & Other Accts (293 Accts)	293	
	gpm	**%**
Daytime Mean Flow Rate	638.1	
Minimum Night Flow	328.8	100.0%
Observed Usage [readings]	28.1	8.5%
Domestic Usage [assessed]*	40.8	12.4%
Irrigation Usage *+	8.0	2.4%
Apartment Usage *+*	19.0	5.8%
Domestic Leakage **	33.7	10.3%
Total of Known & Est. Usage	**129.61**	**39.4%**
Leak Potential	199.2	60.6%
Allowable Leakage (UARL) ++	30.6	9.3%
Leak Potential [w/o Allowable]	168.6	51.3%

Notes:

* *Domestic Usage estimated at 4 gallons in 1 out of 2 accounts during the test period;*

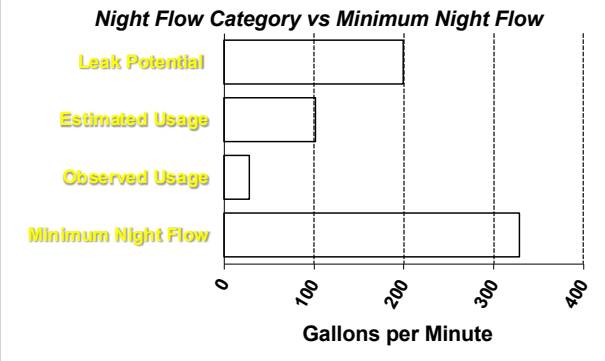
*+ *Sprinkler usage estimated 15 gpm in 1 out of every 60 irrigation accounts;*

+ *Apartment usage estimated at 6 gallons in 1 out of every 3 Units;*

** *Plumbing Leaks estimated at 0.25 gpm in 1 out of every 20 Comm, Res & Apt units;*

++ *Allowable Leakage or UARL: 60.4 miles distribution mains @ 30.6 gpm;*

The primary purpose of night flow measurements is to provide a "Yes or No" answer as far as leakage potential is concerned. Based on the night flow data and the line break history, the City's water system appears to have a significant leakage potential of about 199 gpm (104.7 MGY).



This chart showing a comparison of the night flow rates, illustrates the significant impact of nighttime use in the distribution system. In particular the non-visible leaks in the system and the UARL are a major components of the night flow rates.

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4.9 NON REVENUE WATER

The ultimate goal of this study has been to analyze all aspects of water production and utilization that impact the metered ratio. The monthly difference between production and sales is substantial and costly. Understanding its component parts will make it easier for the City of Rockdale to implement on-going corrective action. During this water audit the fundamental components we have reviewed are:

1. Metered Supply.
2. Metered Consumption.
3. Authorized un-metered water use.
4. Known leakage.
5. Non-visible leaks.
6. Unauthorized water use.

The following table provides our assessment of the City's Non Revenue Water components:

4.9.1 SUMMARY OF NON REVENUE WATER IN CITY OF ROCKDALE

Source Data From:	Category	MGY	As % of Production	$ Valuation
Chapter 2	Total Un-Adjusted Water Production	266.613	111.1%*	
Chapter 2	Total Adjusted Water Production	239.976	100.0%	$129,587
Chapter 3	Total Consumption Billed	182.180	75.9%	$1,900,138
	Total Base NRW	**57.796**	**24.1%**	
	Summary of NRW Components:			
Chapter 4.7	Un-Billed Metered Use	6.881	2.9%	$71,769
Chapter 4.7	Authorized Un-Billed & Un-Metered Use	4.978	2.1%	$51,923
Chapter 3.4	Estimate of Meter Under-Registration	8.287	3.5%	$86,433
Chapter 4.9	Data Handling Discrepancy	0.456	0.2%	$4,756
Chapter 4.9	Unauthorized Consumption (theft)	0.456	0.2%	$4,756
Chapter 4.3	Losses from Repaired Leaks	16.178	6.7%	$8,736
Chapter 4.5	Allowable Leakage (UARL)	16.054	6.7%	$8,669
Chapter 4.6	Other Sources of Loss	0.000	0.00%	$0
Chapter 4.9	Estimate of Undetermined Losses	11.386	4.7%	$6,149
	Total Estimated NRW	**57.796**	**24.1%**	**$243,191**

*Applying well meter over registration to annual data may be over stated since we do not know monthly accuracies over the 12 months.

The base NRW is that derived from the City's production and sales data through December 2022 and our assessment of the production meters. The NRW components are based on our assessment of these items after review of the customer billing database, work order data (leak repairs), field inspections and minimum night flow tests. The assessments are considered "best case". The actual breakdown of NRW components may vary somewhat. However, based on the analysis of potentially oversized large meters, new meter pool in the system, leak history and the nighttime usage, we believe the volumes reported reasonably reflect the current situation. In this table, the current NRW is in the order of 24% of adjusted production or 57.8 MGY. The City cannot expect to recover 100% of these losses.

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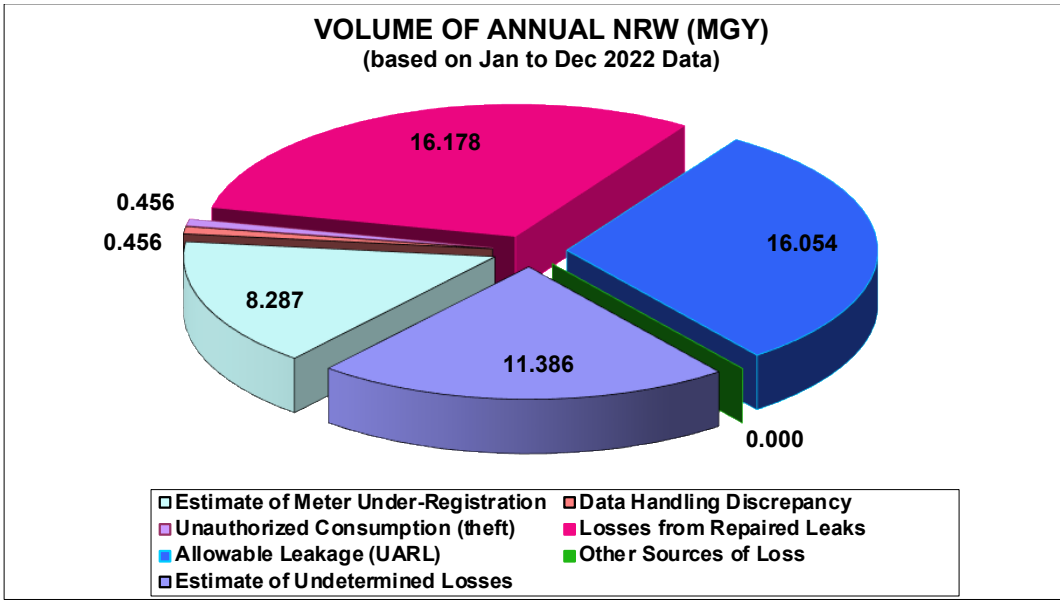
Leaks are endemic in any water system and some meter error must be expected. Perhaps 65% of the assessed volumes are recoverable through the implementation of aggressive remediation programs. However, such programs must be constantly supported, reviewed and maintained. Contributors to the present condition are meter under-registration (large meters) due to meter condition, age or oversizing, estimates of authorized un-metered use as well as distribution side leakage.



The following table applies the data collected in this water audit, including our assessments, to a format suggested by the AWWA in million gallons per year units.

	Water Exported 0.000	Billed Water Exported 0.000			
Own Sources (Adjusted for known errors) 239.976		Authorised Consumption 194.039	Billed Authorised Consumption 182.180	Billed Metered Consumption (inc. water exported) 182.180	Revenue Water 182.180
				Billed Unmetered Consumption 0.0	
			Unbilled Authorised Consumption 11.859	Unbilled Metered Consumption 6.881	Non-Revenue Water (NRW) 64.221
				Unbilled Unmetered Consumption 4.978	
	Water Supplied 239.976	Water Losses 57.796	Apparent Losses 14.177	Unauthorised Consumption (theft) 0.456	
				Customer Metering Inaccuracies 8.287	
				Systematic Data Handling Errors (no data) 0.456	
Water Imported 0.000			Real Losses 43.619	Leaks on Distribution System Repaired plus Undetermined Losses 27.565	
				Leakage and Overflows at Utility's Storage Tanks 0.0	
				Unavoidable Leakage (UARL) 16.054	

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The volumes of "apparent losses" and "real losses" are drawn from the NRW breakdown on the previous page and in this chapter. The breakdown of water main break volumes and service line leak volumes are assessed from the breakdown of historical leaks (repairs from the work order data). These values can vary depending on the nature and frequency of leaks, especially main breaks.

4.9.2 STATE WATER AUDIT REPORTING FORM

For comparison purposes we present the state water audit reporting form using the City's data for 2022.

1	**Water Utility Name: CITY OF ROCKDALE**	**2022 Data**	**Assessment Scale**
1a	Regional Water Planning Area G		
1b	Address: PO Box 586, Rockdale, TX 76567-0586		
2	**Contact Information**		
2a	Name: Jerald Brunson		
2b	Telephone Number: (512) 760-6991		
2c	Email Address: jbrunson@rockdalecityhall.com		
-	Have you completed Water Loss Auditor Training?	YES	
3	**Reporting Period**		
3a	Start Date	1/1/2022	
3b	End Date	12/31/2022	
4	**Source Water Utilization**		
4a.	Surface Water	0.0%	
4b.	Ground Water	100.0%	
5	**Population Served**		
5a	Retail Population Served (2021 US Census estimate)	5,398	
5b	Wholesale Population Served (estimated)	0	
6	Utility's Length of Main Lines (miles)	60.4	2.5
7	Total Retail Metered Connections (Active & Inactive)	2,332	3.0
8	Number of Wholesale Connections	0	
9	Service Connection Density	38.6	
10	Average Yearly System Operating Pressure (psi)	65	4.0
11	Volume Units of Measure	**MG**	
	B. System Input Volume		
12	Volume of Water Intake (for reference purpose only)	266.613	
13	Produced Water	266.613	3.0
13a	Production Meter Accuracy (overall of all meters)	111.10%	3.0
13b	Corrected Input Volume	239.976	
14	Total Treated Purchased Water	0	NA
14a	Treated Purchased Water Meter Accuracy	0%	NA
14b	Corrected Treated Purchased Water Volume	0	
15	Total Treated Wholesale Water Sales	0.000	NA

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15a	Treated Wholesale Water Meter Accuracy	0.0%	NA
15b	Corrected Treated Wholesale Water Sales Volume	0.000	
16	Total System Input Volume	239.976	
-	**C. Authorized Consumption**		
17	Billed Metered	182.180	3.5
18	Billed Unmetered	0.000	3.5
19	Unbilled Metered	6.881	3.5
20	Unbilled Unmetered	4.978	2.5
21	Total Authorized Consumption	194.039	
21a	*Total Metered Usage*	*189.061*	
-	**D. Water Losses**		
22	Water Losses [Line 16 - Line 21]	45.937	
-	**E. Apparent Losses**		
23	Average Customer Meter Accuracy	95.6%	3.5
24	Customer Meter Accuracy Loss	8.287	
25	Systematic Data Handling Discrepancy	0.455	1.5
26	Unauthorized Consumption (theft)	0.455	1.5
27	**Total Apparent Losses**	**9.197**	
-	**F. Real Losses**		
28	Reported Breaks and Leaks	16.178	3.0
29	Unreported Loss	20.562	3.0
30	**Total Real Losses [Line 28 + Line 29]**	36.740	
31	**Total Water Losses (Apparent + Real)**	45.937	
32	Non-Revenue Water	57.796	
-	**G. Technical Performance Indicator for Apparent Loss**		
33	Apparent Losses Normalized (gallons lost/connection/day)	10.81	
-	**H. Technical Performance Indicators for Real Loss**		
34	Real Loss Volume	**36.740**	
35	Unavoidable Annual Real Losses Volume (UARL)	16.051	
36	Infrastructure Leakage Index (I.L.I.)	2.29	
37	Real Losses Normalized - Service Connections	43.16	
38	Real Losses Normalized - Main Lines	1,666.5	
-	**I. Financial Performance Indicators**		
39	Total Apparent Losses [Line 27]	9.197	
40	Retail Price of Water (per MG)	$10,430.00	3.5
41	Cost of Apparent Losses	$95,924.71	
42	Total Real Losses [Line 30]	36.740	
43	Variable Production Cost of Water (per MG)	$540.00	3.0
44	Cost of Real Losses	$19,839.60	
45	Total Cost Impact of Apparent and Real Losses	$115,764.31	
46	Total Assessment Score		**47.5**

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-	**J. System Losses and Gallons Per Capita per Day (GPCD)**		
47	Total Water Loss per Connection per Day (Line 22 / Line 7b / 365)	53.969	
48	GPCD Input	121.8	
49	GPCD Loss	23.32	
-	**K. Wholesale Factor Adjustments**		
50	Percent of Treated Wholesale Water Traveling through General Distribution System	0%	
51	Volume of Treated Wholesale Water Traveling through General Distribution System	0.000	
52	Wholesale Factor	0.000	
53	Adjusted Real Loss Volume	36.740	
54	Adjusted Cost of Real Losses	$19,839.60	
55	Adjusted Total Water Loss Volume	45.937	
56	Adjusted Total Cost Impact of Apparent and Real Losses	$116,921.95	
57	Adjusted Real Loss Per Connection	$43.59	
58	Adjusted Real Loss Per Mile	1,666.520	
59	Adjusted Infrastructure Leakage Index (ILI)	**2.29**	
60	Adjusted Total Water Loss Per Connection Per Day	53.97	
61	Adjusted GPCD Loss	23.32	

4.9.3 INFRASTRUCTURE LEAKAGE INDEX

This AWWA suggested performance indicator is now included in the State reporting format. It is calculated as the ratio of Real Losses over the Unavoidable Annual Real Losses (UARL). The index is considered a measure of the water utility's effectiveness in leakage management and is a dimensionless indicator for comparing performance among water utilities. The lower the value of the infrastructure leakage index (ILI), the closer the utility is operating at the theoretical low level of the UARL.

The following table provides general guidance on setting preliminary leakage reduction targets using the infrastructure leakage index without changing water pressure. Applying the assessed data for YE December 2022, the City of Rockdale's ILI is 2.29, considered acceptable but needing operational improvements. This indicator is lower than in 2021 when it was assessed at 5.99 (no adjustments for production meter errors, etc.). The City should continue with improved production and customer metering and testing, active leakage control practices and network rehabilitation/maintenance.

For the future (next 5 years), Rockdale Utilities' goal should be to maintain an ILI well below 3.0.

It should be noted that when the assessment of Apparent Loss, as well as Authorized Unmetered/Unbilled Water use is well established and reliably accurate, the Real Loss and UARL calculation and consequently the ILI, are more dependable.

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INFRASTRUCTURE LEAKAGE INDEX GUIDELINES

General Guidelines for Setting a Target ILI (without doing a full economic analysis of leakage control options)			
Target ILI Range	**Financial Considerations**	**Operational Considerations**	**Water Resources Considerations**
1.0 – 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning.
>5.0 – 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 – other than as an incremental goal to a smaller long-term target – is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

Source: AWWA Water Loss Control Planning Guide

Performance Category	ILI	Performance Category Description
A	1 - 2	Further loss reduction may be uneconomic unless there are shortages; careful analysis needed to identify cost effective improvement.
B	2 - 4	Potential for marked improvements; consider pressure management, better active leakage control practices and better network maintenance.
C	4 - 8	Poor leakage record; tolerable only if water is plentiful and cheap; even then, analyze level and nature of leakage and intensify leakage reduction efforts
D	> 8	Highly inefficient use of resources; leakage reduction programs imperative and high priority.

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Houston, Texas
December 2022

The Appendix for Large Meter Inspections follows.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 1 Page #: 1 Acct: 02-0892-00 Insp Date: 27-Oct-22 Insp By: JAS

Name: HUNTERS CHASE
Address: 1501 E BELTON
CoR Mtr #43516053 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 1,873.0
Last Rdg Kgals: 66324
Inspected Rdg: 06609682.7
Strainer? Yes
Test Plug? No
By-Pass? Yes
By-Pass Secure? No
Back Flow? No
Inlet Valve? Yes
Outlet Valve? Yes
Vault Type Concrete
Vault Condition Excellent
Vault Cover Alloy
Cover Condition Excellent


IMG_1811 Hunters Chase Apts 3-in Octave.j

IMG_1812 Hunters Chase Apts 3-in Octave.j

IMG_1813 Hunters Chase Apts 3-in Octave.j

IMG_1814 Hunters Chase Apts 3-in Octave.j

Partly flooded vault. By-Pass valve not locked off.

ID 2 Page #: 2 Acct: 02-1050-02 Insp Date: 27-Oct-22 Insp By: JAS

Name: LOS ROBLES MH PARK
Address: 1300 E CAMERON
CoR Mtr #44516605 **Conf Meter #** Correct
CoR Mtr Mfr MASTEROC
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 4 **Conf. Mtr Size** 3
Kgal/Yr: 2,019.0
Last Rdg Kgals: 43601
Inspected Rdg: 04332949.7
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair

IMG_1805 Los Robles MH Entrance.jpg

IMG_1806 Los Robles MH 4-in Octave.jpg

IMG_1807 Los Robles MH 4-in Octave.jpg

IMG_1808 Los Robles MH 4-in Bad Encoder.

Small plastic meter box above ground.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 3 Page #: 3 Acct: 01-1630-04 Insp Date: 27-Oct-22 Insp By: JAS

Name: YOUTH OPPORTUNITY CENTER
Address: 696 N FM 487
CoR Mtr #43505497 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 2.0
Last Rdg Kgals: 93970
Inspected Rdg: None
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair

IMG_1801 Youth Opportunity Ctr 3-in Octa


IMG_1802 Youth Opportunity Ctr 3-in Octav


IMG_1803 Youth Opportunity Ctr 3-in Octav


IMG_1804 Youth Opportunity Ctr 3-in Octav

Small plastic meter box. Meter not functioning; buried in dirt.

ID 4 Page #: 4 Acct: 04-2475-00 Insp Date: 28-Dec-22 Insp By: JAS

Name: ROCKDALE HOSPITAL
Address: 1700 BRAZOS
CoR Mtr #44503765 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 172.0
Last Rdg Kgals: 2718
Inspected Rdg: 0030258.8
Strainer? No
Test Plug? No
By-Pass? None observed
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? No
Outlet Valve? No
Vault Type Concrete
Vault Condition Poor
Vault Cover Steel
Cover Condition Poor


IMG_2883 ROCKDALE HOSPITAL 4-in Octav


IMG_2884 ROCKDALE HOSPITAL 4-in Octav


IMG_2885 ROCKDALE HOSPITAL 4-in Octav


IMG_2886 ROCKDALE HOSPITAL 4-in Octav

Vault partly filled with dirt. Very heavy steel covers: no hinges-hazard to open.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

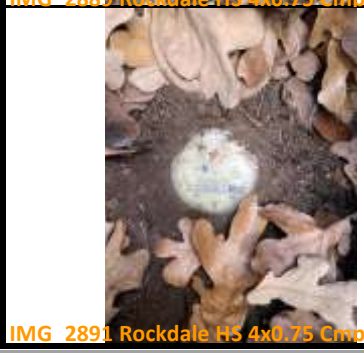
ID 5 **Page #:** 5 **Acct:** 04-2461-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: **RISD Rockdale High School**
Address: 500 CHILDRESS
CoR Mtr #1021030H **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr IMC
Conf Mtr Type Turbine
Meter Model: TWM2001
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 0.0
Last Rdg Kgals: 26612
Inspected Rdg: 02661200
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? Yes
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2888 Rockdale HS Entrance.jpg


IMG_2889 Rockdale HS 4x0.75 Cmp.jpg


IMG_2890 Rockdale HS 4x0.75 Cmp.jpg


IMG_2891 Rockdale HS 4x0.75 Cmp.jpg

Small plastic meter box filled with dirt & leaves. Broken register on low flow meter.

ID 6 **Page #:** 5 **Acct:** 04-2461-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: **RISD Rockdale High School**
Address: 500 CHILDRESS
CoR Mtr #1021510L **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr IMC
Conf Mtr Type Multi Jet
Meter Model: Unknown
CoR Mtr Size: 0.75 **Conf. Mtr Size** 0.75
Kgal/Yr: 0.0
Last Rdg Kgals: 5478
Inspected Rdg: None
Strainer?
Test Plug?
By-Pass?
By-Pass Secure?
Back Flow?
Inlet Valve?
Outlet Valve?
Vault Type
Vault Condition
Vault Cover
Cover Condition


IMG_2888 Rockdale HS Meter Box.jpg


IMG_2889 Rockdale HS 4x0.75 Cmp.jpg


IMG_2894 Rockdale HS 4x0.75 Cmp Broken


IMG_2892 Rockdale HS 4x0.75 Cmp.jpg

Part of previous meter assy. Broken register.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 7 Page #: 6 Acct: 05-3820.-00 Insp Date: 28-Dec-22 Insp By: JAS

Name: RISD Rockdale Junior High School
Address: 814 BUSHDALE
CoR Mtr #211104266 **Conf Meter #** Correct
CoR Mtr Mfr MASTEROC
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 178.0
Last Rdg Kgals: 1781
Inspected Rdg: 000196171
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2918 RISD Rockdale Junior High 3-in O


IMG_2919 RISD Rockdale Junior High 3-in O


IMG_2920 RISD Rockdale Junior High 3-in O


IMG_2921 RISD Rockdale Junior High 3-in O

Small plastic meter box. Meter buried in dirt.

ID 8 Page #: 7 Acct: 03-1486-00 Insp Date: 28-Dec-22 Insp By: JAS

Name: RISD Rockdale Track & Field
Address: 821 MURRAY
CoR Mtr #33532237 **Conf Meter #** Correct
CoR Mtr Mfr MASTEROC
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 588.0
Last Rdg Kgals: 21650
Inspected Rdg: 02294640
Strainer? No
Test Plug? No
By-Pass? Yes
By-Pass Secure? No
Back Flow? Yes
Inlet Valve? Yes
Outlet Valve? Yes
Vault Type Concrete
Vault Condition Excellent
Vault Cover Alloy
Cover Condition Excellent


IMG_2912 RISD Rockdale Track & Field 3-in


IMG_2913 RISD Rockdale Track & Field 3-in


IMG_2914 RISD Rockdale Track & Field 3-in


IMG_2915 RISD Rockdale Track & Field 3-in

Large vault, well drained. By-Pass valve not locked off.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 9 **Page #:** 8 **Acct:** 05-2010-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: **RISD Rockdale High School**
Address: 1205 MURRAY
CoR Mtr #1448189 **Conf Meter #** Correct
CoR Mtr Mfr
Conf. Mtr Mfr Sensus
Conf Mtr Type SR Cmp
Meter Model: SR Cmp
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 264.0
Last Rdg Kgals: 166390
Inspected Rdg: 16724700
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? Yes
Outlet Valve? No
Vault Type Steel
Vault Condition Fair
Vault Cover Steel
Cover Condition Fair


IMG_2906 RISD Rockdale HS Conf Ctr SR C


IMG_2907 RISD Rockdale HS Conf Ctr SR Cm


IMG_2908 RISD Rockdale HS Conf Ctr SR Cm


IMG_2909 RISD Rockdale HS Conf Ctr SR Cm

Conference Ctr. Very old SR compound meter. Heavy cover-no hinges-hazard to open.

ID 10 **Page #:** 9 **Acct:** 01-1275-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: **HOUSING AUTHORITY**
Address: 100 CORDOVA
CoR Mtr #33532236 **Conf Meter #** Correct
CoR Mtr Mfr MASTEROC
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 4,231.0
Last Rdg Kgals: 64287
Inspected Rdg: 07085802
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2934 HOUSING AUTHORITY 3-in Octa


IMG_2935A HOUSING AUTHORITY 3-in Oct


IMG_2936 HOUSING AUTHORITY 3-in Octav

IMG_2937 HOUSING AUTHORITY 3-in Octav

Small plastic meter box. Customer just completed leak repair after meter. (50 MF Units?)

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 11 Page #: 10 Acct: 04-2628-03 Insp Date: 28-Dec-22 Insp By: JAS

Name: CGCG PROPERTIES PECAN RIDGE
Address: 200 MEADOW
CoR Mtr #6121658H **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Turbine
Meter Model: DBC-Hi
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 19.0
Last Rdg Kgals: 15650
Inspected Rdg: 001566300
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2895A PECAN RIDGE APTS 4x1 Cmp.jpg


IMG_2896 PECAN RIDGE APTS 4x1 Cmp.jpg


IMG_2897 PECAN RIDGE APTS 4x1 Cmp.jpg

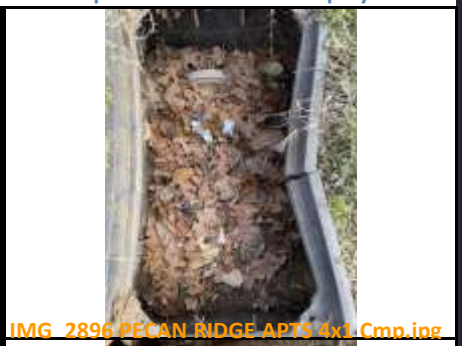

IMG_2900 PECAN RIDGE APTS 4x1 Cmp.jpg

Damaged meter box, filled with dirt & leaves. (approx. 37 MF Units)

ID 12 Page #: 10 Acct: 04-2628-03 Insp Date: 28-Dec-22 Insp By: JAS

Name: CGCG PROPERTIES PECAN RIDGE
Address: 200 MEADOW
CoR Mtr #8374618 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Multi Jet
Meter Model: DBC-Lo
CoR Mtr Size: 1 **Conf. Mtr Size** 1
Kgal/Yr: 1,448.0
Last Rdg Kgals: 139978
Inspected Rdg: 4062342
Strainer?
Test Plug?
By-Pass?
By-Pass Secure?
Back Flow?
Inlet Valve?
Outlet Valve?
Vault Type
Vault Condition
Vault Cover
Cover Condition


IMG_2895 PECAN RIDGE APTS 4x1 Cmp.jpg


IMG_2896 PECAN RIDGE APTS 4x1 Cmp.jpg


IMG_2901 PECAN RIDGE APTS 4x1 Cmp.jpg


IMG_2905 PECAN RIDGE APTS 4x1 Cmp.jpg

Part of previous meter assy.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 13 Page #: 11 Acct: 04-3391-02 Insp Date: 28-Dec-22 Insp By: JAS

Name: QUALITY INN
Address: 702 W HWY 79
CoR Mtr #3910876 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Turbine
Meter Model: DBC-Hi
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 0.0
Last Rdg Kgals: 10590
Inspected Rdg: 001829000
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair

IMG_2923 QUALITY INN 4x0.75 Cmp.jpg


IMG_2925 QUALITY INN 4x0.75 Cmp.jpg


IMG_2926 QUALITY INN 4x0.75 Cmp.jpg


IMG_2927 QUALITY INN 4x0.75 Cmp.jpg

Small plastic meter box. Leak in meter box. MB filled with dirt & leaves.

ID 14 Page #: 11 Acct: 04-3391-02 Insp Date: 28-Dec-22 Insp By: JAS

Name: QUALITY INN
Address: 702 W HWY 79
CoR Mtr #3910876L **Conf Meter #** Correct
CoR Mtr Mfr
Conf. Mtr Mfr Master Meter
Conf Mtr Type Multi Jet
Meter Model: DBC-Lo
CoR Mtr Size: 0.75 **Conf. Mtr Size** 0.75
Kgal/Yr: 623.0
Last Rdg Kgals: 72612
Inspected Rdg: xx380820
Strainer?
Test Plug?
By-Pass?
By-Pass Secure?
Back Flow?
Inlet Valve?
Outlet Valve?
Vault Type
Vault Condition
Vault Cover
Cover Condition

IMG_2923 QUALITY INN 4x0.75 Cmp.jpg


IMG_2924 QUALITY INN 4x0.75 Cmp.jpg


IMG_2928 QUALITY INN 4x0.75 Cmp.jpg


IMG_2929 QUALITY INN 4x0.75 Cmp.jpg

Small plastic meter box. Part of previous meter assy. Scratched lens: register unreadable.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 15 Page #: 12 Acct: 02-2935-00 Insp Date: 28-Dec-22 Insp By: JAS

Name: CITY YARD
Address: 465 MILL FILL
CoR Mtr #101013394 **Conf Meter #** 33532247
CoR Mtr Mfr MASTEROC
Conf. Mtr Mfr Master Meter
Conf Mtr Type Ultra Sonic
Meter Model: Octave
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 356.0
Last Rdg Kgals: 5401
Inspected Rdg: 00540558.7
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Air Gap
Inlet Valve? Yes
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2948 City Yard Stand Pipe 3-in Octave


IMG_2949 City Yard Stand Pipe 3-in Octave.

IMG_2950 City Yard Stand Pipe 3-in Octave.


IMG_2951 City Yard Stand Pipe-Address.jpg

Shallow meter box, above ground, partly filled with dirt. At risk in freezing weather.

ID 16 Page #: 13 Acct: 02-2925-00 Insp Date: 28-Dec-22 Insp By: JAS

Name: CITY YARD
Address: 465 MILL WATER F
CoR Mtr #253370 **Conf Meter #** CNV
CoR Mtr Mfr
Conf. Mtr Mfr ARAD
Conf Mtr Type Turbine
Meter Model: Unknown
CoR Mtr Size: 3 **Conf. Mtr Size**
Kgal/Yr: 0.0
Last Rdg Kgals:
Inspected Rdg: None
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2967 City Yard Bldg 3-inT Broken Reg.j

IMG_2968 City Yard Bldg 3-inT Broken Reg.j


IMG_2970 City Yard Bldg 3-inT Broken Reg.j


IMG_2971 City Yard Bldg 3-inT Broken Reg.j

Small plastic meter box, filled with dirt. Broken register. No reads for years. Serves water operations building.

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 17 **Page #:** 14 **Acct:** 01-1242-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: CITY IOOF CEMETERY
Address: 901 N MAIN
CoR Mtr #5366564 **Conf Meter #** Correct
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Turbine
Meter Model: MMT
CoR Mtr Size: 3 **Conf. Mtr Size** 3
Kgal/Yr: 11.0
Last Rdg Kgals: 4527
Inspected Rdg: 00462044
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? Yes
Inlet Valve? Yes
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Poor


IMG_2939 CITY IOOF CEMETERY 3-inT.jpg


IMG_2940 CITY IOOF CEMETERY 3-inT.jpg


IMG_2943 CITY IOOF CEMETERY 3-inT.jpg


IMG_2944 CITY IOOF CEMETERY 3-inT.jpg

Small plastic meter box, buried in dirt. Appears to be seasonal use.

ID 18 **Page #:** 15 **Acct:** 02-0285-00 **Insp Date:** 28-Dec-22 **Insp By:** JAS

Name: RAINBOW COURTS
Address: 915 E CAMERON
CoR Mtr #6913604 **Conf Meter #** Correct
CoR Mtr Mfr
Conf. Mtr Mfr Master Meter
Conf Mtr Type Turbine
Meter Model: Dialog
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 56.0
Last Rdg Kgals: 3122
Inspected Rdg: 00327000
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? Yes
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Poor


IMG_2960A RAINBOW COURTS 4-inT.jpg


IMG_2961 RAINBOW COURTS 4-inT.jpg


IMG_2964 RAINBOW COURTS 4-inT.jpg


IMG_2965 RAINBOW COURTS 4-inT.jpg

This is a multi unit customer. Meter buried in dirt in very small meter box. Possible leak. (approx 25 units)

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CITY OF ROCKDALE, TEXAS
December 2022
LARGE METER INSPECTION REPORT

ID 19 Page #: 16 Acct: 04-0955-03 Insp Date: 28-Dec-22 Insp By: JAS

Name: ROCKDALE RESIDENCE & REHAB
Address: 600 S WILCOX
CoR Mtr #70277509H **Conf Meter #** Correct
CoR Mtr Mfr
Conf. Mtr Mfr Neptune
Conf Mtr Type Turbine
Meter Model: Turbine
CoR Mtr Size: 4 **Conf. Mtr Size** 4
Kgal/Yr: 0.0
Last Rdg Kgals: 15735
Inspected Rdg: None
Strainer? No
Test Plug? No
By-Pass? None observed
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Concrete
Vault Condition Poor
Vault Cover None
Cover Condition NA


IMG_2959 Old Manor Oaks Nursing Hm 4-i


IMG_2955 Old Manor Oaks Nursing Hm 4-in


IMG_2957 Old Manor Oaks Nursing Hm 4-in


IMG_2958 Old Manor Oaks Nursing Hm 4-in

Inactive (aka Old Manor Oaks Nursing Home). Abandoned nursing home. Meter needs to be pulled. Leak in front of property. Possibly a DB Cmp

ID 20 Page #: 17 Acct: 04-0391-01 Insp Date: 28-Dec-22 Insp By: JAS

Name: WAL-MART STORES TEXAS, LP
Address: 709 W HWY 79
CoR Mtr #8414033 **Conf Meter #** CNV
CoR Mtr Mfr MASTER
Conf. Mtr Mfr Master Meter
Conf Mtr Type Turbine?
Meter Model: ML
CoR Mtr Size: 2 **Conf. Mtr Size**
Kgal/Yr: 788.0
Last Rdg Kgals: 91068
Inspected Rdg: 098298550
Strainer? No
Test Plug? No
By-Pass? No
By-Pass Secure? NA
Back Flow? No
Inlet Valve? No
Outlet Valve? No
Vault Type Mtr Box
Vault Condition Poor
Vault Cover Plastic
Cover Condition Fair


IMG_2934 Walmart Poss 3-inT.jpg


IMG_2932 Walmart Poss 3-inT.jpg


IMG_2933 Walmart Poss 3-inT.jpg


IMG_2931 Walmart Poss 3-inT.jpg

Small plastic meter box, filled with dirt. Could not confirm meter size, database says 2-in but could be 3-in. Verify with excavation.

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